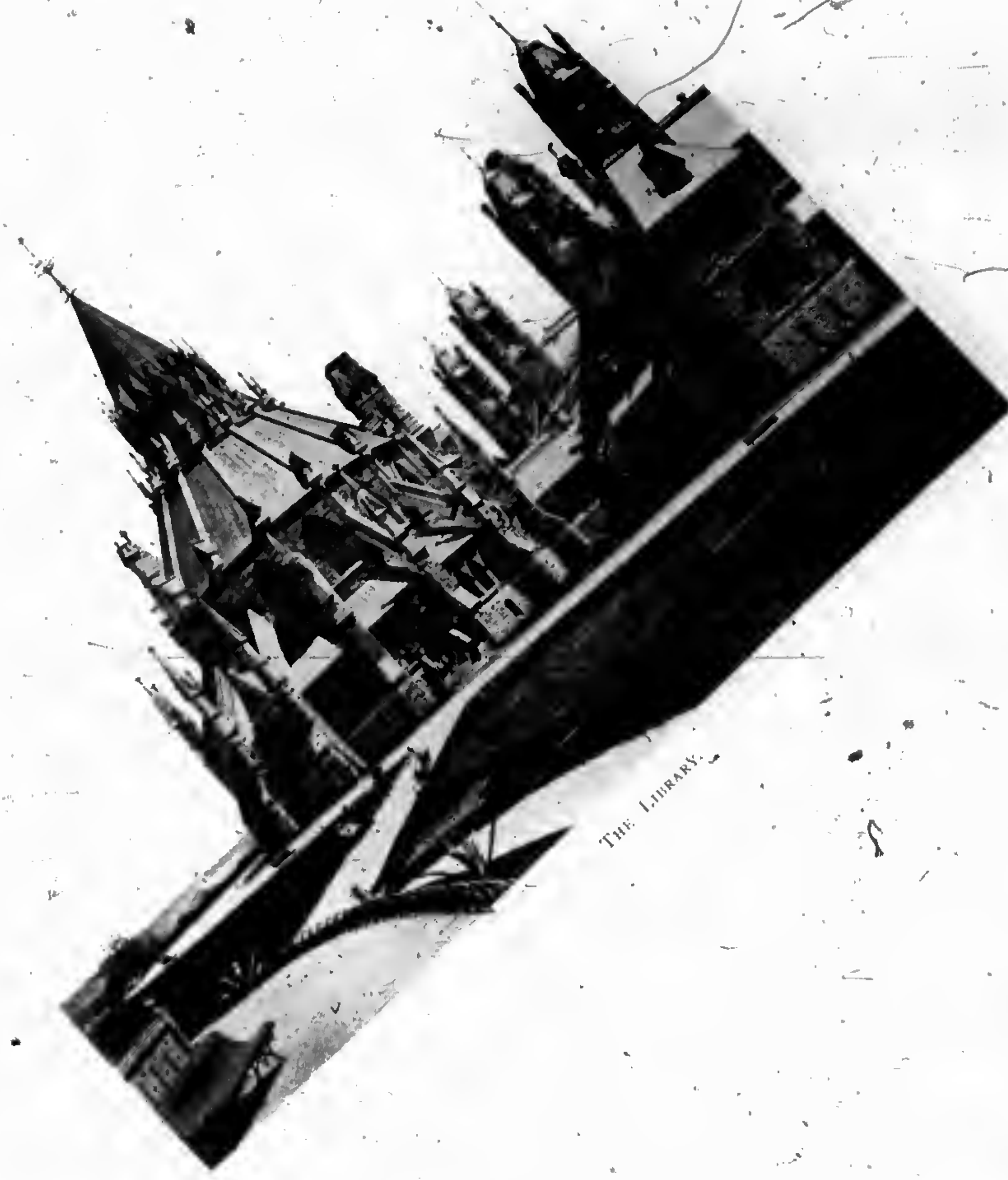
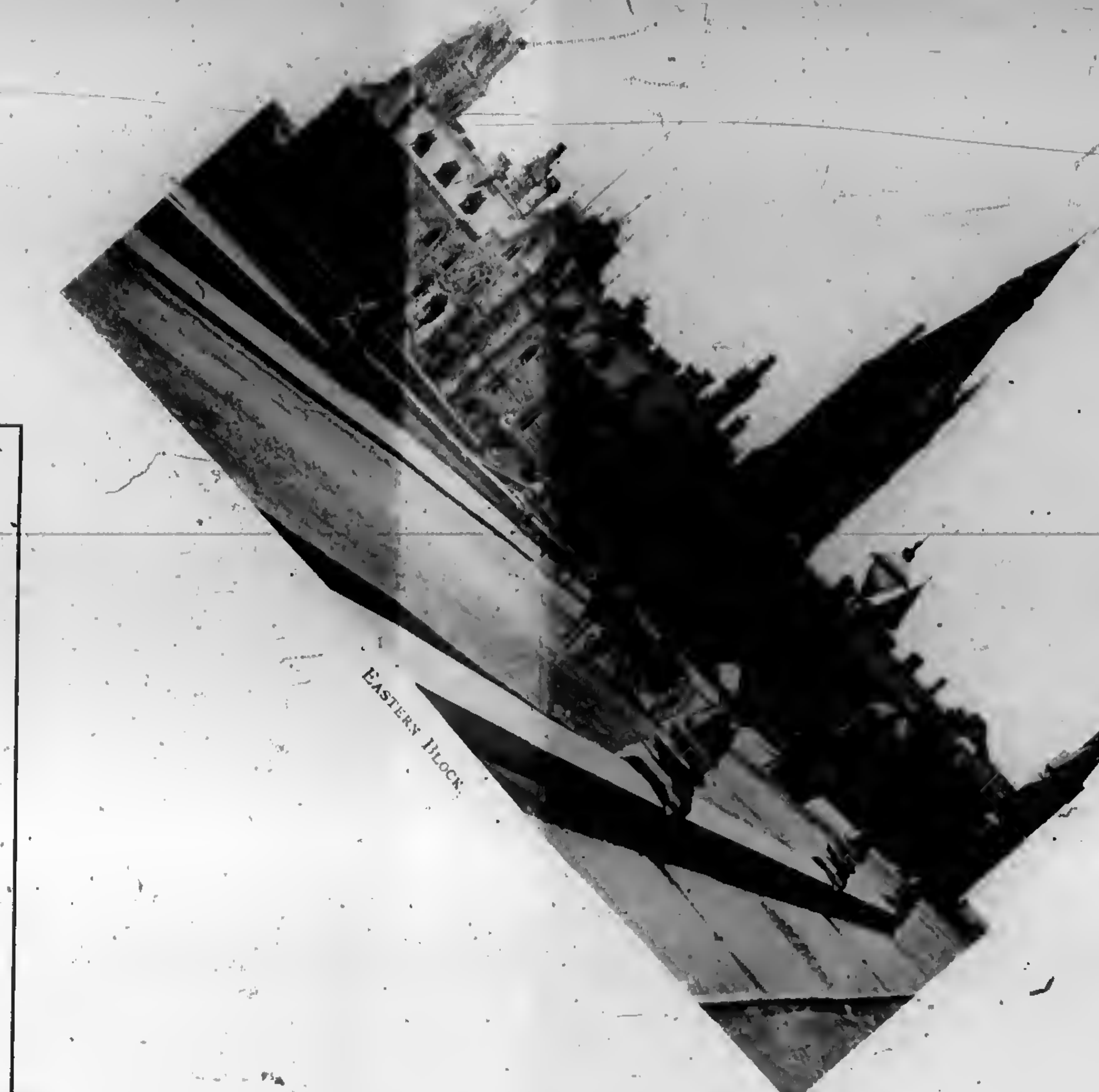
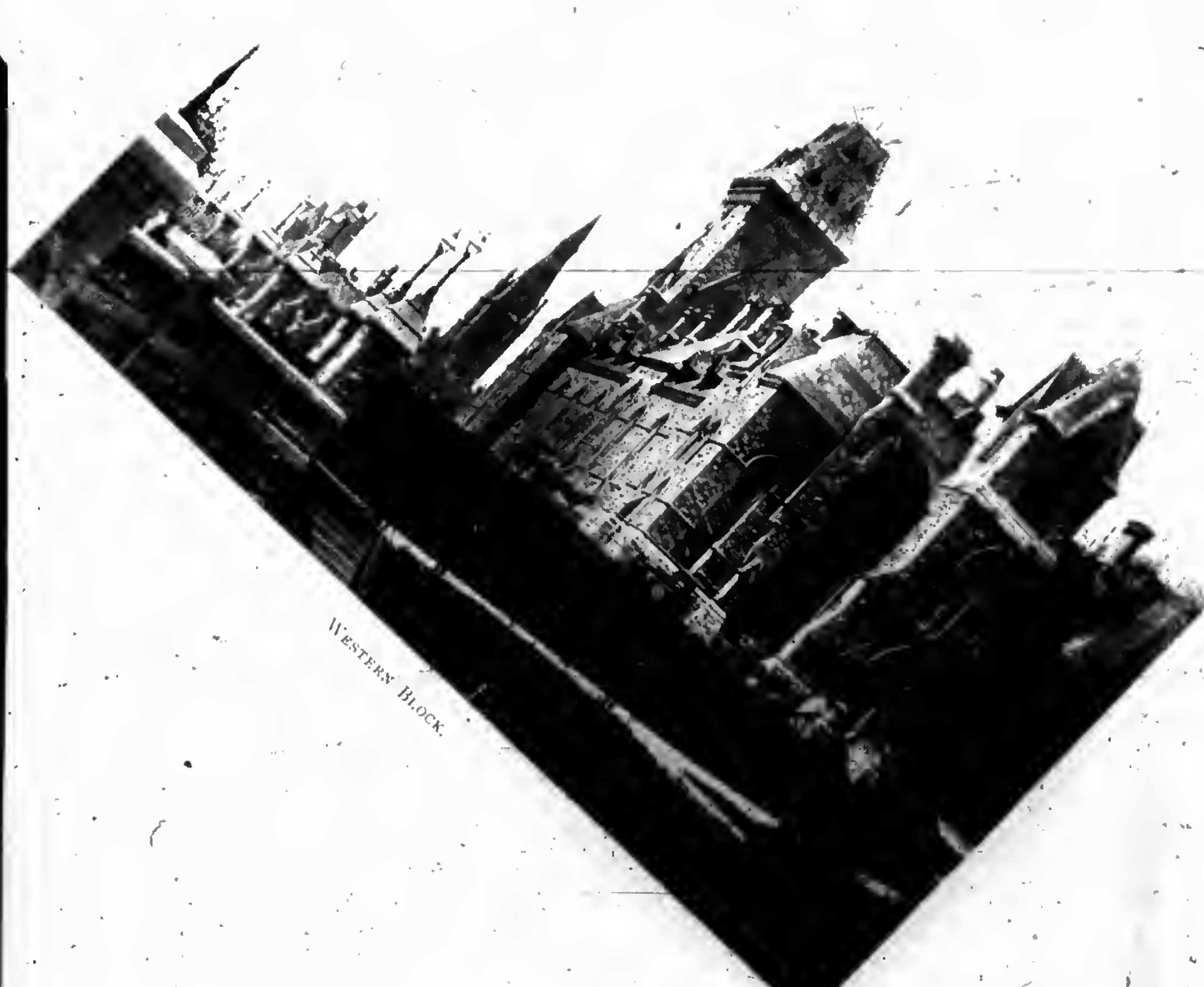


The Library.

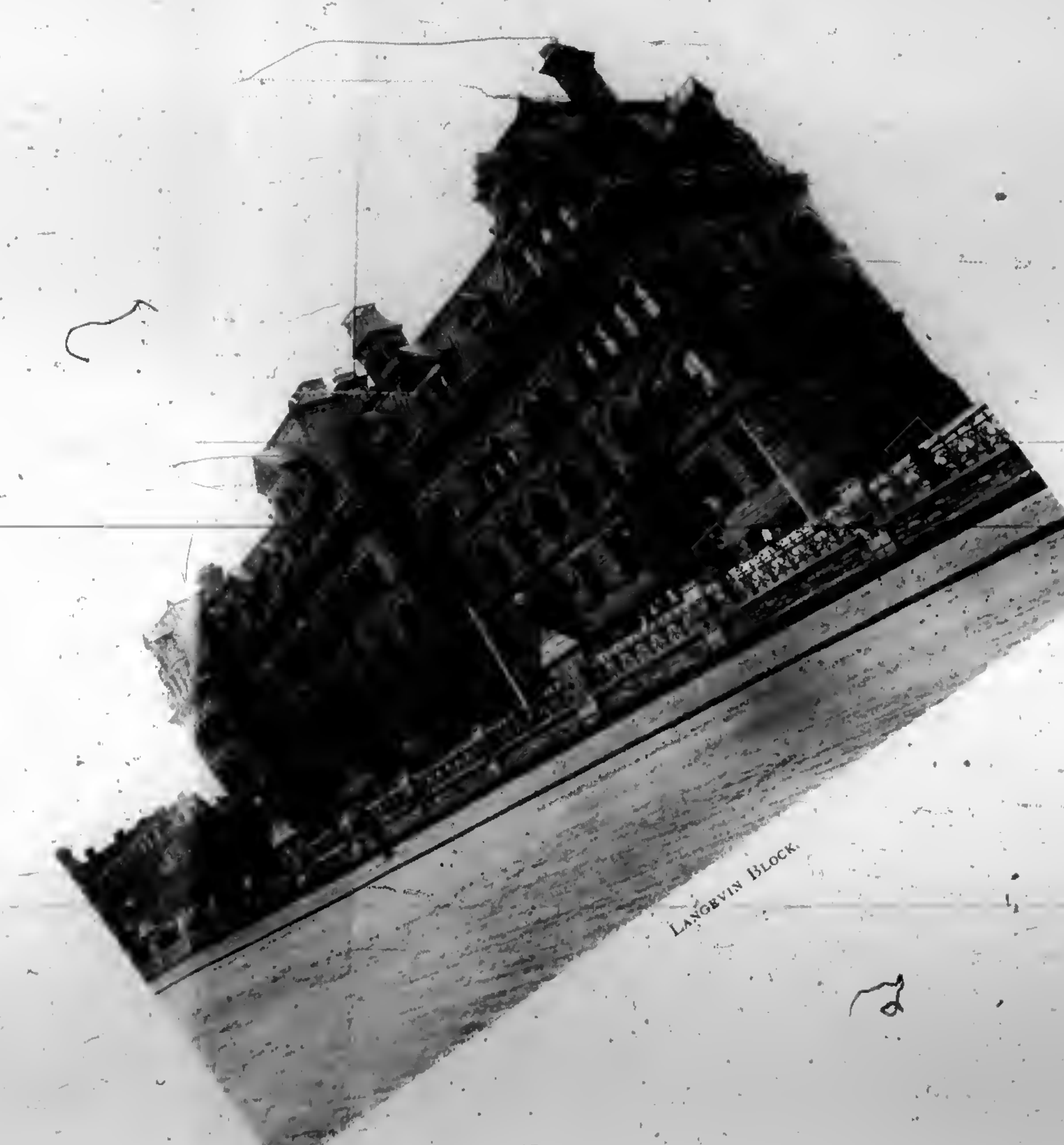


Eastern Block.

Houses of Parliament.



Western Block.



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To Our Readers. IN presenting this, the fourth New Year Number of the ARCHITECT AND BUILDER to our readers, a word of explanation seems necessary. After the contents of this number were arranged, it was learned that an earlier date than usual had been decided upon for the annual convention of the Ontario Association of Architects. It seemed highly desirable that the proceedings of this convention should appear in this number. In order that this might be accomplished it was necessary to defer publication of our annual Building Review and a number of other articles which were designed to have a place in these pages. For the reason mentioned there is scarcely the variety of contents that we could desire, but it is believed that the interesting character of the proceedings of the O. A. A. Convention will in a measure compensate for this. We take this opportunity of thanking those who have assisted us in any way during the year '96, as well as in the production of this number. In this connection we are indebted for our frontispiece design to Mr. T. R. Johnston, of New York, formerly of Toronto. The work itself witnesses to the skill of its author. We ask the kindly co-operation of our readers during 1897, and trust the year may prove a happy and prosperous one to all.

The O. A. A. THE pressure upon our space forbids more than brief mention of the work accomplished by the O. A. A. at the annual convention held in Toronto last week. Two or three points, however, may be emphasized: One is, that those members who between the conventions are heard to complain that the control of the Association is too much in the hands of the Toronto members, were conspicuous by their absence from and lack of interest in the convention. Several of the Toronto members were re-elected to the Council in spite of their earnestly expressed wishes to withdraw, because we presume it was felt that it would not be safe at this somewhat critical juncture to entrust the Association's welfare in the hands of men who had shown but a lukewarm interest in its affairs. The decision to permit Chapters to be formed in Toronto and other cities, seems to be a step calculated to awaken interest in architectural matters throughout the province, and one which should bring added strength to the Association. The suggestion made by the President, in his address, that it would be desirable to classify the members of the Association into Fellows and Associates, with appropriate titles, is one which it was wisely decided to take no action upon at the present time. Other matters of vital interest to the welfare and usefulness of the Association should have precedence and receive the most careful thought and attention during the present year. The Association expressed in no uncertain language its opinion that unless the government take action to render the Ontario Architects' Act workable, it should ask to be released of the responsibility and expense of conducting students' examinations. By voluntarily establishing a Department of Architecture in connection with the School of Practical Science, the Minister of Education recognized the need for the proper education of architects in the future. The architects of Ontario have given every possible assistance to make this Department of Architecture a success. What assistance have they received in return from the Minister of Education and the government? It may confidently be stated that without the co-operation of the architects of the province the Department of Architecture cannot achieve a satisfactory measure of success, and in future that assistance can only be depended on in the event of the Architects' Act being amended in the manner proposed. The architects are tired of spending effort to no purpose for the object of protecting the public against the blunders of incompetent "architects" in the future, and are still more tired of being asked by the government to make bricks without straw.

REASONS FOR A DOMINION ASSOCIATION OF ARCHITECTS.

By Chas. Baillairge, Past President P. Q. A. A.

AND why not, as with the Canadian Association of Engineers? "In union there is strength"—there has always been—and hence the proverb, "United we stand, divided we fall." This is true of every calling in life, of every trade, profession, industry.

The Association wants a tariff; but will any government frame one which will be accepted by every separate province, even if it be expedient to have one? Not at all. To command respect such a tariff must be universal, so to say; it must be a natural or spontaneous one as they have in France, in England. Nor need it in any way be legislated on to be abided by, but be of general consensus. It must be customary, and custom in the end becomes law; for, on what are all our laws founded, but on common requirements.

The Association has a tariff founded or based on charges current throughout Europe, the United States of America, and among all civilized nations; nor would this have any the more the force of law if declared valid by governmental or legislative action of any kind.

This question was debated at our annual meeting at the Florence, Quebec, some two or three years ago, with several members of our Province of Quebec legislators present when, as will be remembered; while the then Premier Taillon seemed to favor government action in the premises, Attorney General Casgrain advanced most pertinent reasons to the contrary.

Our charges are not disputed, that the writer is aware; and as it behooves him, maybe, to show that such is the case, he may say that in no less than thirteen separate cases, of expropriation of properties for the St. Charles branch of the Intercolonial railway, and where there could have been no understanding between the several clients as to fees to be paid for the varied services, (hundreds of dollars in each case), he charged and was paid the regular fee of $3 per hour—say at the rate of $15 for a legal day of 5 hours, or from 10 to 4 with an hour off for lunch; there never was any dispute, never a word about his charges, though mostly from $30 to $50 per diem, due to double or treble the number of hours work during the 24 hours, as the writer has done during all his long career and only feels the better now and livelier for the extra time put in.

Suppose now we had a tariff, and in special cases where our time is worth $5 to $10 an hour, as when dealing with important arbitration cases, where hundreds of thousands are at stake, or in reporting on some subject where long experience has rendered our services invaluable—suppose, I say, that in such a case no agreement has been made, no understanding arrived at as to the renumeration to be received, then if the tariff were legal or binding, the client could say: Sir, you cannot charge me more than such a figure, and we would be forced to abide thereby—this is where the disadvantage of a tariff comes in; while, as said before, on important cases the man of great experience may charge his $100 fee or $100 or more per diem, as the writer has often done and been paid without a murmur, as in the case of the Sherbrooke water works, in the calculation of the water power of the Montmorency Falls, as Shanley and Parent charged $300 each for a less than 3 days report in 1883 on the tenders for the new Loretto main; as many architects have done in like cases; as a lawyer will do, a la Osler, $200 a day where a million or even half that is at stake.

Believe me, gentlemen of the profession, Attorney General Casgrain was right in this respect, and so say I with my 50 years experience of the professional and industrial world.

The architect's and engineer's ordinary charge of 5% on cost of structure is not too high. On the contrary, in very many cases, it is hardly remunerative, and seems to have been founded, so to say, on, or assimilated to, the rate of interest on capital; while in many cases this 5% would not begin to pay an engineer in the designing of a complicated piece of machinery, as a pumping engine or a printing press, or an architect in the designing of a pulpit, a reredos, an altar or a tabernacle, or where a whole structure is a mass of intricate composition, as with Perrault & Venne's chapel of the Sacred Heart, Taylor's gem of the Diocesan College of Theology, where every detail, to the tiniest molding, each finial and crocket and even to the roof slating, bears the impress of the artist's handiwork.

Again, this 5% may be too high and is not charged where, for instance, a series of stores or dwelling houses are all built to one and the same design; since plans alone and specifications are taken at 2½ per cent. and this percentage or a portion of it saved the proprietor or client.

Then upon due consideration, I say, let the tariff be—it will become venerable with age and have the force of law without any of the concomitant disadvantages of its legal surroundings.

This 5% tariff has evidently not been arrived at without due consideration, and is certainly founded in practice; for in the case of the new Quebec water works, put in by the writer in 1883 and which have cost just half a million dollars, which at 5% would have given the engineer $25,000. The writer made a study of the figure of 5% by entering in a journal every hour devoted to the work, as taken upon surveys, general and detail drawings, specifications, estimates, reports on, calling tenders, preparing blank forms, superintending work, and these added and put down at the aforesaid $3 per hour, amounted to within a mere fraction of what the same would come to at the usual 5% on the outlay.

There is another and just as important matter—may be more so, for consideration—when a Dominion Association would be better able to bring about the needful legislation or obtain reform—I mean, a simple justice, which now we have not, and why? Because lawyers are generally law makers, and while taking care of themselves in this respect, and of notaries, and the medical profession on appeal to them by the latter or to the legislature or parliament, have ignored and left out architects and engineers, who, it will hardly be credited, have not, under our laws, the right to go into the witness box and testify in their own cases.

This is a matter of the most glaring inequality or denial of justice. If, for instance, through the client's fault, or conveyance of wrong information in the premises, the notary has to draw up new papers for the same thing, the lawyer to plead the same case in another or still another court, he will take care to be paid for all he does, and can, on his own testimony, convince the court that he is right; or the physician, that he treated his patient for a complication of two or more diseases—while, with the architect, he may be and often is called on, after one design has been made to proprietor's instructions, and though it pleases him in every way, to cut down and absolutely do his work over again to suit his client's purse, who will, on completion of the building, only pay his 5% on cost of structure as erected, and leave the poor architect unremunerated for his first or preliminary set of plans, knowing, as he does, that the architect cannot be heard in court in his own behalf.

The writer called the attention of those present at last yearly meeting of the Association to this important matter, and has had occasion in a recently published pamphlet of his, delivered free to architects for their information, to cite a special case of the kind where, after having planned for a certain institution a $50,000 aqueduct to supply two adjacent villages, and finding that these suburban districts would not pay for water such a figure as would materially relieve the institution in its cost for interest on capital expended, reduced its scheme to the supply of only its own precincts thereby paying the engineer his percentage on only $25,000, with not a cent for his six weeks' work devoted to the larger scheme, and when calling on his lawyer to sue for his 2½% on first series of plans, quantities and estimates, was met with the discouraging reminder that he could not go into court to prove his own case, and that the proprietors would of course be sure to put their case before the court in a way to secure judgment.

Now, is this not a subject for federal legislation, and if it is, or even if only of local import, would not the asking for it be enhanced if coming from all the architects of Canada, united into one general association, rather than from merely a provincial body?

Again, is not some legislation imperative the better to define the responsibilities of architects, proprietors and builders? Where is the justice of rendering the architect responsible for ten years in case a building should fall and kill some one or subject its owner to the cost of reconstructing it, when so many things may have happened in ten years to bring about a failure of the structure or of a portion thereof, and the architect or builder may be in no way to blame. Why this picking out of the architect or engineer? Why select him for punishment? Why hold him up to the vengeance of the law? and if he does kill his man or ruin him; in what, pray thee, is he more guilty than the lawyer, who, through his negligence or ignorance, loses his client's case and throws him on the charity of the world; in what more guilty than the apothecary who deals out poison in mistake for medicine; the medical man who, as happens every day, kills his patient or shortens his career on earth by mistaking one "algia" or "itis" for another.

These are vital questions of the utmost importance to the architect, and never will any change likely be brought about except by the combined efforts of all the professionals of the Dominion to amend the laws governing such matters.

Another reform to be advocated, and which should be made general in Canada, as it is in England and France, is the enacting of a general association of the profession, that quantities be not taken out by the architect himself who plans and superintends any work, but by a so-called "quantity surveyor," or (by whatever name to be designated) some one outside of the firm which designs and specifies the work to be performed. No architect should, except for his own personal use, and to guide him in keeping within the amount allowed for the building, whatever it may be, take out his own quantities and sell them to any intending tenderer. The fact of doing so is not necessarily wrong, as the quantities may be correct and lead to no difficulty or injustice to any one concerned: the proprietor, the contractor or the architect himself; but quantities very often are either in excess or in deficit; and if so, are necessarily detrimental to the proprietor if high or exaggerated, to the contractor if the contrary.

If the quantities be short, the contractor looks to the architect for indemnification, and as the latter can generally ill afford to come against himself to make good the deficiency and does not

Prairie, and in Winnipeg the Deaf and Dumb Institute, Senator Sanford's warehouse, G. F. & J. Galt's warehouse, George D. Wood & Co.'s warehouse; Maxwell & Co.'s warehouse, James Robertson & Co.'s warehouse, Baskerville & Co.'s warehouse; Regina Anglican church; Morden Methodist church; Euclid schools, the residences of F. H. Mathewson and E. F. Stephenson.

Mr. Wheeler takes great interest in music, and has gained considerable repute as a vocalist and choir-trainer, musician and critic. Two of Mr. Wheeler's sons are following the profession of architecture, one in St. Paul, Minn., the other in his father's office.

MR. S. FRANK PETERS,

has been practising his profession in Winnipeg about four-and-a-half years, having removed there from Toronto in July, 1892. Mr. Peters is the eldest son of the late Samuel Peters, C. E., of London, Ont., in which city the subject of this sketch was brought up and educated, although born in England. He studied architecture with the late William Irving, architect, of Toronto, at the same time taking up the course of civil engineering in Toronto University, and subsequently travelled extensively, in the interests of his profession, in the United States and Canada. He commenced active practise in London, Ont., in 1872, and continued there till he removed to Toronto, early in 1891, from which place he went to Winnipeg, as above stated.

Mr. S. Frank Peters.

While residing in London, Mr. Peters was connected with the 7th Fusiliers of that city, and commanded a company of that regiment during the North-west rebellion of 1885, and received injuries in that campaign which resulted in the loss of an arm.

MR. GEORGE BROWNE

was born in Montreal and is the youngest son of the late George Browne, of that city, who was for many years a prominent architect and extensive owner of real estate. Mr. Brown is of English and Irish ancestry. After leaving the Montreal high school Mr. Browne entered his father's office, and at the age of eighteen went to New York, where he studied in the office of Mr. Russell Sturgis, who was at that time one of the leading architects of the Empire city. At the end of three years he visited Europe, where he remained for three years-and-a-half, studying the different styles of architecture in England, Ireland, France, Italy and Switzerland. He took a course at South Kensington school of art, and was awarded prizes at the international competition in the class for design.

In 1879 he went to Manitoba and entered for a homestead and pre-emption of 320 acres in the Tiger Hills district south of Holland, which was then a wild and unsettled country. After undergoing for some years the hardships and privations of a pioneer life, he came to Winnipeg and resumed the practice of his profession.

Mr. Browne's ability as an architect is evidenced in the buildings he has erected in Winnipeg, among which may be mentioned: The Massey building; Miller, Morse & Co.'s building; the City market, which was won in competition; the Granite curling rink, which has a clear span of 95 × 200 feet; the buildings on the ten farms for Sir John Lister Kaye, Bart; Maple Shade, the private residence of Mr. Geo. H. Strevel; the Strevel terrace; the residences of Mr. T. J.

Mr. George Browne.

McBride, R. H. Agur, R. H. Bryce, J. C. Gordon and the one occupied by Hugh John Macdonald, M. P.

MR. WALTER CHESTERTON

was born at Kensington, London, England, in the year 1845. He was educated at private schools, and studied at South Kensington School of Art. He was articled to Messrs. Waller & Son, Lyall street, Belgrave square, London, with whom he remained nine years. In 1871 he came to Canada and commenced practice at Ottawa, where he built the post office, custom and inland revenue office building for the Dominion government, and St. George's church, in addition to various private residences and business premises, besides taking professional charge of the erection of the Ottawa branch of the Bank of Montreal, St. Andrew's Church and the Collegiate Institute for Montreal architects.

When the Royal Canadian Academy of Arts was instituted, Mr. Chesterton was nominated by Lord Lorne associate architect, entitling him to the title of A. R. C. A.

He removed to Winnipeg in 1881, soon afterwards being joined by Mr. McNichol, of Scotland, and practised under the firm name of Chesterton & McNichol, but for the past seven years has been alone. The principal public buildings he has erected are the jail for the eastern judicial district, reformatory for boys, Brandon; public school, Regina; the public schools of Fort Rouge and Stonewall, now in course of erection;

Mr. Walter Chesterton.

officers' quarters, Fort Rouge, and St. Mary's church, Virden. Among the private residences may be mentioned those of A. W. Ross, M. P., Fort Rouge; J. Stewart Tupper and Ernest Stewart, Assiniboine street, and many other business premises and private dwellings in town and country.

MR. H. S. GRIFFITH,

who is a son of Rev. G. S. Griffith, of Adley Rectory, was born in Oxfordshire, England, in 1865. He was articled from 1882 to 1885 to Messrs. Webb & Tubbs,

like to make his error known by billing the proprietor for it, who is not legally, though may be morally bound to do the needful towards the builder; he, the architect, to save himself, is tempted to and does, almost of necessity, make it up to the contractor by exaggerating extras or additions, minimizing deductions for works omitted, allowing the contractor to skimp the work or portions of it, winking at defects or faulty materials, and even in thinning out the walls, curtailing the projection of outside cornices of wood or stone, the girth of inner plaster ones, making molded and ornamental work less salient and thus less effective, and accepting two coats paint instead of three, and in other ways not readily to be detected by the proprietor, who rarely, if ever, goes to the trouble of verifying such details, not generally affecting the style of work, the distribution of the building or the comfort of the tenants.

This is no imaginary case, an architect having had to refund to a contractor a sum of several thousand dollars covering a deficit of over half a million in the quantity or number of bricks in a certain building, and which would likely have been double the amount, had not all the walls, in anticipation of such a claim against the architect been, so it is said, made thinner by from 4 to 7 inches, to help diminish the absolute deficit.

Nor should any contractor be allowed to be or act as his own architect, no more than a notary is allowed to draw up his own deeds or those affecting his nearer relations. This it is which gives rise to the often repeated assertion that such and such a work or building does not look as well, as effective as it did on the paper. How often has the writer not seen work shirked or skimped in this way, where the detail drawings not being made in advance and signed as a binding portion of the contract; these details made to look effective on the general drawings, as in designing the roof or vaulting of a church for instance, where moldings and groinings to be effective must be salient and carving deeply cut, are made to look so in advance by deep shades and shadows cast, and are found in execution to be entirely wanting in these particulars.

Nothing but a general association of interests throughout the Dominion is likely to bring about reform under this head, and render country curates and even city ones awake to the true economy of always emloying an architect to oversee the work of another architect when acting as his own contractor.

But for self improvement and advancement is a general association of the profession pertinent. See how it is now with the associations in the provinces. The general meetings are held successively and alternately: For the Province of Quebec, in Montreal and Quebec city; for Ontario, in Toronto and may be some other prominent city or two of that province. This is not sufficient; the thing becomes monotonous, and architects lose all interest in thus either meeting continuously in the same city, or alternately in only two cities of the province.

The field of enquiry and observation must needs be developed. Look at the Royal Society of Canada. Interest in it and its assemblages is flagging. Members do not attend, except those residing in Ottawa, where the society, with a single exception (once at Montreal) holds its yearly meetings. Nor is this just to outsiders who year after year have to pay their way to and from the capital, and their living expenses while there.

A general association would have a choice of all Canadian cities of sufficient importance to warrant a displacement. In addition to Toronto, Montreal and Quebec, we should then have Halifax to look to, Hamilton, Winnipeg, St. John, N. B., Victoria, B. C., and other cities. The society might also some day, or now and then, visit the more noted cities of the United States, as New York, Washington, Boston, Chicago, Philadelphia, St. Louis, New Orleans, etc.

Look at the British Association for the Advancement of Science. If this assemblage of the wisdom of a nation finds it to its advantage to cross the Atlantic to Canada as it did some years ago to Toronto, I believe, next year to Montreal; surely we who have seen less of the world would benefit by migration now and again.

See the many scientific, professional, architectural, engineering associations of the United States, how they are constantly travelling on invitation from place to place; how, in each city they visit, they are taken hold of, wined and dined and driven around to see everything respectively of interest to each.

But this must not happen so often to one and the same place as to wear one's welcome out. Montreal cannot without taxing itself too heavily and too often, receive the architects of the rest of the Dominion every two years as at present. Much less can poor Quebec afford to follow suit in such hospitality, but let the thing occur once in five or ten years, and after such an interval there is something new to see, then does the reception become an event, a pleasure, and the expense comparatively trifling.

Cities like Quebec and Hamilton can hardly have enough of novelty in less than 5 to 10 years to warrant a return to them on a mission of self advancement; nor can even Toronto or Montreal in one or two years, offer inducements enough to the profession to go about and visit the few really interesting structures that may spring up in so short a time, while after a period of several years, all monotony is dispelled, old scenes are almost forgotten, and the scenery and buildings put on a novel and attractive aspect.

Great benefit is to be thus had by becoming acquainted with others of the same profession, the mind is developed, new ideas are imbibed, taken hold of, modified and improved on.

The Royal Society has at last come to understand this, and meets in Halifax next year to celebrate the 400th anniversary of the discovery of North America by the brothers John and Sebastian Cabot, when a monument will be erected as nearly as known on or near the very land fall of these hardy explorers and navi-

New blood is wanted all the time, new scenes, new climes to revel in so to say, as with the botanist, the geologist, the seeker after other forms of fauna.

The London Surveyor, a paper devoted to the interests of municipal and county engineers and architects is alive to this necessity of association on an extended scale, and in every one of its weekly or monthly issues are given portraits and biographies of its associates, views of buildings and engineering works completed, views of the town halls or municipal buildings of all the cities visited in turn, accounts of receptions, balls and dinners tendered to the visitors, with full details of all the proceedings and descriptions of all the points and objects of interest the members of the convention are called on to examine, enjoy and become acquainted with.

Hardly a day passes but what the writer receives some invitation to attend a conversazione of the kind in some city or other of the neighboring republic, and this is what so forcibly reminds him of the advantages of such visits and meetings.

The writer cannot be suspected of any other interest than that of the Association in thus advocating its extension from the Atlantic to the Pacific; since he has pretty nearly been about the world and does now but advocate for others what he has found of advantage to himself.

It must not be all work and no recreation. Our human nature could not, cannot stand it. These social gatherings, when made subservient to one's material interests, are not only of advantage to us all, but indispensable, so to say, in these days of rapid advancement in so many sciences, professions, industries and manufactures, and even in the very and varied modes of conveyance, in palace cars and stately floating palaces, on the way, is there much to be admired, much to learn.

A GROUP OF WINNIPEG ARCHITECTS.

We are pleased to be able to present herewith portraits and brief sketches of several of the most prominent architects of Winnipeg. Mr. S. Frank Peters is already well known in Eastern Canada, as is also Mr. Geo. Browne, who for several years has made annual visits to Ontario. If the movement for the formation of a Dominion Association of Architects should assume tangible form, we may entertain the expectation of being privileged to make the personal acquaintance of all these gentlemen in the near future. Meanwhile the Architect and Builder is striving to bring the architects of the Dominion into closer relationship.

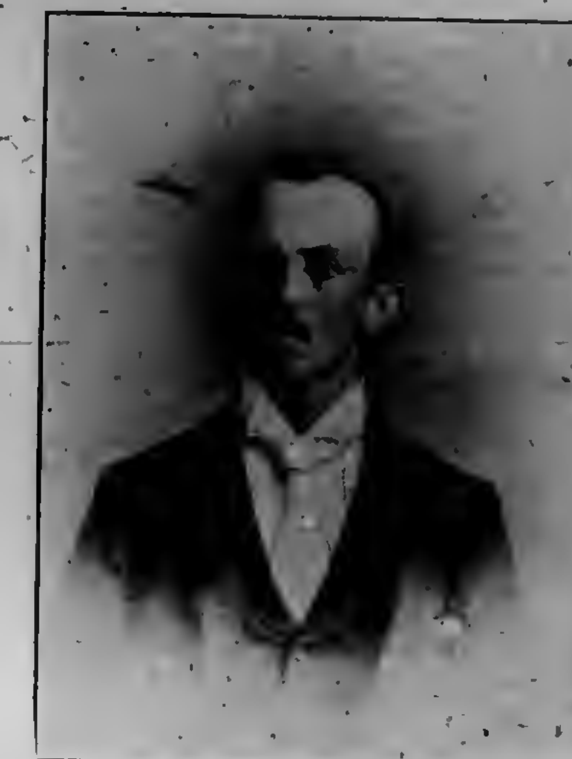
CHAS. H. WHEELER

was born fifty years ago in Lutterworth, county of Leicester, England, where he was educated at the grammar school and by the Vicar of the parish. He decided to adopt the profession of architecture, and began his calling by mastering the rudiments, having

Mr. Chas. H. Wheeler.

first served a technical course at the carpenter's bench, and in turn on the bricklayer's scaffold, at practical painting, and at the banker of the stonemason. He also learned the art of pattern-making at the Coventry Engine and Art Metal Works, and subsequently was student and clerk of works under two eminent London architects. Mr. Wheeler has carried out many important works in London, the provinces, and on the continent of Europe. He took up his residence in the North-west in the spring of 1882, since which time he has been actively engaged. He gained the Holy Trinity competition over sixty competitors from all parts of America. Besides building this handsome church he has carried out over two hundred and seventy other works in Manitoba and North-west Territories, including the Home for Incurables, Portage la Prairie; Merchants' bank, Brandon; Moosomin Methodist church, Queen's Hotel, Moosomin; High School, Port Arthur; Jail, Portage la

architects, Reading, and as draughtsman in 1886, to Mr. T. H. Watson, District Surveyor, London. He came to Winnipeg in the spring of 1887 and found employment in the Northern Pacific engineer's office, and subsequently in the Land Titles office. He began practice as an architect in 1893, and has erected a con-



Mr. H. S. Griffith.

siderable number of buildings for commercial and residential purposes, among which may be mentioned the wholesale warehouse of Mr. Thos. Ryan and the residence of Mr. G. H. Shaw, chief passenger agent of the C. P. R.

MR. HUGH MCGOWAN

was born of Scottish parents near the city of St. Thomas, Ont. After having learned the trade of carpenter and stair builder, he removed to Flint, Mich., where he studied architecture and sanitary engineering, particularly those branches which should form part of the education of an architect, viz., heating, plumbing and ventilation. Having lost his health through overwork, Mr. McGowan emigrated to the Canadian Northwest in the hope of being benefitted by the change of

Mr. Hugh McGowan.

climate. Soon after arriving there, he opened an office for the practice of architecture in Winnipeg, of which city he has now been a resident for sixteen years. Mr. McGowan has successfully carried out commissions for the Provincial Government of Manitoba, the Winnipeg and Morden School Boards, as well as many private citizens, and is architect for the Board of Directors of the Winnipeg General Hospital.

Messrs. S. H. Townsend and J. Gemmell, two Toronto architects, left last week for Baltimore, en route to the Southern States. They propose spending some weeks on a bicycle tour, viewing the scenery and architecture.

ILLUSTRATIONS.

RESIDENCE AT OTTAWA.—E. L. HORWOOD, ARCHITECT.

SUMMER RESIDENCE.—R. FINDLAY, ARCHITECT, MONTREAL.

RESIDENCE, ROSEDALE, TORONTO.—DICK & WICKSON, ARCHITECTS.

THE "TEMPLE BUILDING," BAY STREET, TORONTO.—GEO. W. GOUINLOCK, ARCHITECT.

HOLY TRINITY CHURCH, WINNIPEG, MANITOBA.—CHAS. H. WHEELER, ARCHITECT.

Between the years 1860 and 1870 settlement began to be formed around the Hudson's Bay trading post known as Fort Garry. In the year 1871 this settlement became incorporated as the City of Winnipeg. At that time the nearest church to Fort Garry was St. John's Cathedral, a plain edifice about two miles off. It is typical of the great hold which church-going had upon the minds of the early pioneers to be told that settlers would walk or drive 10 miles or more, taking their lunch with them to be present at the services at St. Johns.

About the year 1868 the parish of Holy Trinity was formally created and organized, thus acquiring the proud destinction of being the first church established in the city, one of its wardens being the late Lieut.-Governor Sir John C. Schultz. A primitive frame edifice was built at the corner of Portage avenue and Main street, which lasted until the year 1875 when it was determined to erect a larger and more pretentious structure; this also was of framed wood. The present rector, the Ven. Archdeacon Fortin, assumed charge of the parish this same year.

In 1883 plans were received from all parts of America in competition for a new church to be placed in a new position on the corner of Donald and Graham streets. After considerable discussion the design prepared by Chas. H. Wheeler, an English architect, was unanimously adopted. The work commenced immediately, and on the 25th day of July, 1884, the church was opened by the Primate of Canada in the presence of a large gathering of the clergy and laity. Such, in brief, is the historical development of Holy Trinity church.

The structure itself is built of solid stone throughout, is cruciform on plan and gothic in style. There are no galleries. The roof, being of hammer beam construction, spans the whole auditorium; the preacher, therefore, can be easily seen from all parts of the building.

The total length of nave and chancel is 150 feet clear, the width of nave 56 feet, width of chancel 25 feet.

There are two transepts, a commodious organ chamber in which has been erected a large organ containing 42 stops. The three vestries form an architectural feature in the south-east side, with a small stone tower and spire; the main tower with spire on the west front remains to be finished; a temporary bell structure somewhat disfigures the view from this point. Rockland slates have been used, and the whole of the windows contain stained glass.

The main walls of the church are built of Stoney Mountain limestone, from a picked strata of a bluish-grey tint, the dressings and buttresses of Selkirk limestone, and all the apexes, bases, crosses, labels, etc., are worked in Ohio stone, which the severity of our winters has sobered down, and is now in harmony with the colors of the native limestone.

The roof inside is a marked feature of the design, being open timbered and having delicately cut tracery to the spandrils and panels. The pulpit, chancel and sanctuary stalls and choir seats are in oak and walnut, handsomely carved; the nave pews are framed in American yellow pine and walnut.

There are handsome polished brass upright gas standards, and specially designed wrought iron grille work for the altar and chancel rails. Belgium black marble columns adorn the arches of organ chamber and the big chancel arch. Ohio columns with carved capitals are placed under the posts of the hammer beams.

The church seats eleven hundred adults comfortably. Its total cost was between sixty and seventy thousand dollars.

CANADIAN PARLIAMENT BUILDINGS, OTTAWA.—MESSRS. FULLER & JONES, AND STENT & LAVER, ARCHITECTS.

We have pleasure in presenting as one of the chief features of this New Year Number, illustrations of the Parliament and Departmental Buildings at Ottawa. These illustrations are reproductions to a reduced scale of large and beautiful photographs, kindly placed at our disposal by the Minister of Public Works and the Chief Architect of the Department, Mr. Fuller, who, by the way, is also one of the architects of the buildings. To the latter gentleman we are also indebted for a copy of a report presented to Parliament in 1876, by the then Chief Eengineer of Public Works, the late Mr. John Page, containing a brief account of the principal events connected with the construction of the buildings.

It is learned from this report that the first direct action which appears to have been taken towards fixing on a place for the permanent seat of government, was on the 24th March, 1857, when resolutions were passed by the House of Assembly to the following effect:—

That the sum of two hundred and twenty-five thousand pounds be appropriated for the purpose of providing for the necessary buildings; and that an address be presented to Her Majesty, praying Her to select "some one place as the permanent seat of government in Canada."

A despatch from the Colonial Secretary, dated 31st December, 1857, conveying Her Majesty's selection of Ottawa as the seat of government, was communicated to both branches of the Legislature, on the 16th March, 1858.

The place having been thus chosen, and the site of the buildings fixed upon, the Department of Public Works issued a notice, dated 17th May, 1859, inviting architects to prepare and submit designs for parliament buildings, and for the public departments, by the 1st day of August following, and stating that the structures "are proposed to be

built in a plain substantial style of architecture, of coursed hammer-dressed masonry, &c."

"All information as to the sites of the buildings, their size, number of rooms, &c., necessary for the preparation of the plans, can be obtained at the office of the department."

This notice resulted in sixteen designs for parliament buildings being submitted, by fourteen different competitors; and seven designs for departmental buildings by six different competitors; the whole of which were exhibited, and afterwards examined by gentlemen deemed competent to judge of their comparative merits.

His Excellency the Governor General in Council approved the recommendation, awarding the premiums as follows:

Parliament building: 1st, Fuller & Jones; 2nd, Stent & Laver.

Departmental building: 1st, Stent & Laver; 2nd, Fuller & Jones.

Governor's residence: 1st, Cumberland & Storm; 2nd, Fuller & Jones.

These gentlemen were subsequently instructed by the department to make certain alterations in their plans, with a view to their better adaptation to the purposes contemplated; they were also requested to have these changes made, and specifications of the works prepared, by the 15th of October following.

On the 8th of September, public notice was given, that tenders for the construction of the buildings would be received until the 1st day of November, and that the plans and specifications could be seen at Quebec, Ottawa and Toronto, on and after the 15th October. The time, however, was extended to the 15th November, when twenty-one tenders were received for the parliament buildings, and twenty-nine for the departmental buildings.

The tender of Thomas McGreevy was accepted, for the bulk sum of $348,500 for the construction of the parliament buildings; and a contract was entered into with him on the 7th December, 1859, for their completion by the 1st day of July, 1862.

About the same time the construction of the departmental buildings was awarded to Messrs. Jones, Haycock & Clarke, at the bulk sum of $278,810, and the time fixed by the contract for their completion, was th 1st February, 1862.

The architects who received the first premiums were, on the 29th November, 1859, appointed to superintend the execution of the works connected with the respective buildings, at a commission of about five per cent. upon the contract sum.

No adequate provision having been made for heating and ventilation in the accepted plans, a notice was issued on the 14th November, 1859, calling upon competent parties willing to undertake this service, to tender for its performance, on or before the 30th December, and to submit the details of the system which they proposed to adopt, as also to guarantee its efficient working, for a period of ten years after completion.

In accordance with this notice nine tenders were received, and on the 28th January, 1860, the work was awarded to Charles Garth, at the bulk sum of $61,285. This was understood to include the furnishing and fitting up of the whole of the apparatus necessary for the heating and ventilation of all the buildings, except certain alterations as to the mode of warming the wings of the parliament buildings.

The building contractors commenced operations on the 20th December, and were principally occupied, during the winter of 1859-60, in the excavation of foundations, preparing materials, and making arrangements for carrying on the works in the ensuing spring.

The masonry was commenced on the parliament buildings on the 26th April, 1860, and in June the foundations of the main central tower were laid. On the eastern block for the departments building operations began on the 2nd April, and the works were then generally proceeded with.

On Saturday, the 1st September, 1860, H.R.H. the Prince of Wales laid the corner-stone of the pier immediately under the north-east angle pillar of the legislative council chamber; and in the early part of December building operations were generally stopped for the season.

About this time it became necessary to obtain more ample information in regard to the expenditure on, and management of, the works, than was in possession of the department. With this object in view, an order in council was passed on the 18th December, 1860, authorizing the chief engineer to be sent to Ottawa, for the purpose of reporting fully on all matters connected with the general character, superintendence, and progress of the works, &c., &c., from the commencement up to that period.

A detailed report was submitted by that officer on the 26th April, 1861, recommending certain changes to be made, by which the works could be resumed under a different system of management and supervision.

During the season of 1861 they were continued agreeably to the suggestions contained in the report above referred to, until the 1st of October, when the appropriation having been exhausted, they were suspended by order of the hon. the commissioner.

The Hon. H. H. Killaly was, on the 21st September 1861, instructed to proceed to Ottawa and ascertain what arrangements could be made to protect the buildings during the ensuing winter, and to report generally upon their condition and the best mode of settling with the contractors for works which had been performed, &c.

That gentleman accordingly submitted a report, dated 12th November, 1861, embodying his views upon these matters, and accompanied by a progress estimate, showing, in detail, the amount which he considered should be paid to the contractors for the various items of work, &c., done by them up to the 1st October, 1861, at rates and prices fixed by him. On the 11th and 12th March, 1862, he sent estimates of the work done during the months of October and November, 1861; and on the 16th April, 1862, another report was furnished by him, which contained a summary of his previous estimates, together with an estimate of the probable cost of completing the buildings.

In 1862, the sum of $188,344.30 was appropriated, under the head of "unprovided items," for the previous year, and a further sum of $500,000 was granted by the legislature towards the construction of the buildings.

The contractors urging a settlement for the works they had performed, and alleging certain claims for their suspension, a commission was appointed, under the great seal of the province, on the 21st June, 1862, to enquire into all matters connected with the construction of the buildings and management of the works, so far as they had then been proceeded with, and to advise the government as to the best method of carrying them on in future; and also to supply an estimate of the probable cost of their completion.

The gentlemen forming this commission had a re-measurement made of the whole of the works, and examined a large number of witnesses as to their past management, value of labor and materials, and other matters connected with the subject.

At this time there had been paid to Mr. Thomas McGreevy, for work performed, the sum of $483,163.95, and to Messrs. Jones, Haycock & Co., the sum of $511,391.54.

On the 29th January, 1863, the report of the commission was submitted to the government, containing, amongst other matters, a recommendation that the works remaining to be done should be offered to the original contractors, at a schedule of prices fixed by them (the commissioners).

This proposition having been acceded to by the government, and after considerable discussion, agreed to by the contractors, on the 18th April, 1863, contracts were entered into with Thomas McGreevy, for the completion of the parliament buildings; and with Messrs. Jones, Haycock & Clarke, for the completion of the departmental buildings, at a schedule of prices to be applied to the different classes and items of work.

Under this arrangement, the claims alleged by the contractors as arising out of the first contracts, were left in abeyance.

Before the new contracts were entered into, the specifications were, however revised; and it was deemed advisable, that instead of paying the architects by commission, as formerly, they should be paid fixed salaries.

In carrying out this system, Mr. Thomas Fuller and Mr. Charles Baillairge, were appointed joint architects for all the buildings; and in accordance with the provisions of the new contracts, a general superintendent was also appointed.

The architects formerly in charge of the buildings, preferred certain claims against the government, for matters arising out of their supervision under the first contract.

The works were proceeded with, and considerable progress made in the season of 1863. During the session of this year, the sum of $100,000 was granted towards construction.

In May, 1864, it was deemed advisable that the chief engineer should proceed to Ottawa, and assume control of the works, in order that questions connected with them might be determined on the spot, and thereby avoid the delay caused by reference to the department, then at Quebec. The method of furnishing supplies of gas and water, &c., was then decided, and the necessary works for these objects commenced.

During this season (1864), all the branches of work connected with the buildings were urged forward as rapidly as circumstances would permit. In the estimates for this year, a further sum of $400,000 was appropriated towards their completion.

The contractors having repeatedly requested a settlement of the claims alleged by them to have arisen out of their first contract, and the architects having also applied for a settlement in connection with their supervision, it was decided in October, 1864, to refer these matters to special arbitration.

For this purpose the government appointed one arbitrator, the claimants another, and these two selected a third. These three gentlemen formed a board, before which the several cases were argued by counsel, and evidence produced by the respective parties. The arbitrators, after a searching enquiry into the various matters brought before them, awarded to Messrs. Jones, Haycock & Clarke, in connection with their contract for the departmental buildings, on the 8th day of March, 1866, the sum of $88,176, and for costs the sum of $2,203.

In the cases of the architects, the arbitrators awarded on the 2nd day of July, 1866, to Messrs. Fuller & Jones, the sum of $5,064, and $181 for costs; and to Messrs. Stent & Laver, the sum of $6,931, and $200 for costs.

In May, 1865, the services of Mr. C. Baillairge, one of the architects, were dispensed with.

In May, 1865, it was decided that the public departments should be moved to Ottawa, in the fall of the year, and the contractors were notified to make every exertion to have the buildings ready for their reception by that time.

The clearing and grading of the grounds was then proceeded with, and the formation of roads to the different blocks of buildings urged forward. By the month of October, the buildings were sufficiently advanced to permit of their occupation by the several departments to which they had been allotted, and the roads were partially made. About this time the removal of the government took place.

The wings and central portion of the parliament buildings were also in such a state of forwardness as to admit of a number of the offices being occupied, and of the library being placed in the building.

This year the legislature granted a further sum of $300,000 toward the completion of the works.

In May, 1866, the claims preferred by Thomas McGreevy, for matters arising out of his first contract for the construction of the parliament buildings, were, by mutual consent, referred to the sole arbitration of the chief engineer, who, after hearing and considering the evidence produced, awarded to the claimant, on the 12th day of November, 1866, the sum of $61,785.

The two chambers and other rooms necessary for the accommodation of the legislature were so far completed as to admit of a session being opened on the 8th of June, 1866, during which the sum of $500,000 was granted towards the buildings.

In November, 1866, permission was given to Thomas McGreevy to transfer his contract for the completion of the public buildings to Robert H. McGreevy.

In the fall of this year the departmental buildings were completed, and in March, 1867, a settlement in full was made with the contractors for all work performed under or connected with the new or second

contract, which, in the aggregate amounted to the sum of $436,199.72.

In February, 1867, authority was granted to make certain alterations in the legislative assembly chamber, for the accommodation of the increased number of members forming the House of Commons under the confederation of the provinces. These works are now completed.

The departmental buildings having been finished, and the works on the parliament buildings well advanced, the staff was considerably reduced in the spring of 1867, and in the month of May, the services of Mr. Thomas Fuller, architect, were dispensed with.

The site chosen for the buildings is in the centre of the city of Ottawa, about a mile below the Chaudiere Falls, on a prominent rocky point jutting out into the Ottawa River, at an elevation considerably higher than the city and lands in the vicinity. On the eastern side it is flanked by a deep ravine, in which are situated the combined locks of the Rideau Canal. The north side is bold and precipitous, and on the western side the ground slopes quickly toward the south-west and diminishes in width. On the southern or lowest side, it is, for a distance of 1,750 feet, bounded by Wellington street, which is one of the principal streets of the city, and descends in a westerly direction towards the falls.

The point is of an irregular shape, 1,050 feet wide at the centre, and contains an area of fully 29 acres. It was formerly known as Barrack Hill, and is a part of the ordnance lands conceded to the province.

The buildings are placed so as to form three sides of a quadrangle, measuring from north to south 600 feet, from east to west 700 feet, and containing an area of over 9½ acres.

The parliament building is on the north side of the square, upon which it has a frontage of 472 feet. It faces toward the south, and its extreme depth at the centre is 370 feet, covering an area of about 82,886 superficial feet, or about 1 9-10 acres.

The departmental buildings form the east and west sides of the square: they are of a rectangular shape, having both quadrangle and southern fronts, the line of the latter being 100 feet north of Wellington street.

The eastern block has a frontage on the square of 319 feet, and 245 feet on the south. It covers an area of 41,840 superficial feet, or fully nineteen-twentieths of an acre.

The western block has a frontage towards the south of 277 feet, and on the quadrangle of 220 feet, with an area of 32,276 feet superficial, equal to about seventeen-twentieths of an acre. Thus the total area covered by all the buildings is about 3 7-10 acres.

The parliament building is on the highest part of the ground, and its basement floors are about 159 feet above the ordinary summer water level of the Ottawa River. Those of the eastern and western blocks are respectively 135 feet 3 inches and 142 feet 3 inches over the same datum.

A continuous carriage road has been made all round the square, and extended northward at both ends of the parliament building towards the Speaker's towers, and also along the southern fronts of the departmental buildings.

The entrances to the grounds are opposite Elgin and Metcalf streets. From these points the roads incline gently to within a short distance of the parliament building, where they ascend by a steeper grade to the level of a wide terrace, which has been formed along the southern front of that structure.

The square has been graded to a gradual rise from the road which runs parallel with Wellington street up to the foot of the terrace, and to a plane corresponding to the levels of the eastern and western blocks.

All the buildings are constructed in what may be termed the pointed gothic style of architecture, and from the bold, broken outline they present—their numerous towers, high pitched, variegated slate roofs, pierced by dormers and surmounted by ornamental wrought iron cresting and terminals, together with the quaintness of the carved figures, combine to produce an imposing and picturesque effect.

The outer facing of the walls is principally composed of a light colored, compact sandstone, obtained from the Township of Nepean, at a distance of about 12 miles from the city. The dressings, stairs, gablets, pinnacles, &c., are chiefly of a greyish colored freestone, from the State of Ohio, and the relieving arches over the door and window openings are of a reddish sandstone, from Potsdam, in the northern part of New York State. The slates are generally of a dark color, with bands of a lighter hue placed at intervals. They are obtained in the State of Vermont.

The foundations and interior portions of the walls are of limestone, quarried in the vicinity. The division walls and lining of the external walls are chiefly of brick, manufactured either at Ottawa or at other places in the province.

The marble used in the buildings was principally obtained from Arnprior and other places on the Ottawa River.

The valley of the Ottawa also supplied the timber used in the construction, with the exception of the oak, which had to be brought from other parts of the province.

The total of the amounts expended on the buildings from 1st May, 1859, to 1st July, 1866, was $2,723,981.58, less $157,788.34 for furniture and fuel. These figures are, of course, exclusive of the cost of the Langevin Block.

The mode of heating adopted throughout the buildings is by steam produced in boilers, situated near the centres of the respective blocks, and applied generally on what is termed the "Vault System."

This may be briefly described as consisting of a series of ducts for the admission of external air, over which are constructed, in the interior of the buildings, vaults for steam pipes leading from the boilers. The air enters these vaults through the perforated coverings of the ducts, is heated by coils of pipes, and subsequently passes through openings in the top of the vaults, into the various rooms, etc. On this system the two legislative chambers and the central portion of the parliament buildings are heated, with the exception of the main vestibule, and the rooms immediately over it. These, together with both the wings, are heated by direct radiation from steam coils, placed in the corridors and various apartments. The other two blocks of buildings are also heated on the Vault System, except a few rooms, where it was considered expedient to place coils for the purpose of heating by direct radiation. In this manner the attics are also warmed.

Two modes have been adopted for the ventilation of the chambers, one termed the "upward system" and the other the "downward system."

The latter provides for drawing off the vitiated air near the floor, through perforated gratings, in the risers of the platforms, on which the members seats are placed. These gratings open into spaces between the arches under the floors of the houses, which are connected at several places with foul air ducts running around the chambers in the basement passages. These ducts are all joined at the north-east and north-west angles of the respective houses, and from thence extended, so as to enter the main extracting shaft, at a level of 7 feet over the boiler house floor.

The air in the shaft being rarefied by the heat of the iron smoke pipes, an upward draught is created, by which the foul air is rapidly extracted through the ducts from the chambers, and escapes through the side openings formed near the top.

The "upward system" may be described as consisting chiefly of a series of small ventiducts, arranged along the ceiling, and leading to others at the sides, of larger capacity, with openings into the ventilating shafts, situated at the north end of the chambers.

The two systems above mentioned are in effective operation in both chambers. In the House of Commons, there is, however, additional means of upward ventilation provided, by the insertion of cast iron perforated gratings in eight of the centre panels of the ceilings over the galleries. These communicate with large ventiducts leading to the shafts, and constructed under the roof on each side of the chamber.

The main drains from all the buildings discharge into the Ottawa River at three points, at the northern base of the hill. They are sunk so as to drain the respective boiler houses, which, as previously stated, are 10 feet below the level of the basement floors. This unavoidably entailed deep cuttings in rock of irregular strata and difficult of excavation. The upper portions of the trenches were, however, used as a channel for the cold air ducts.

As the best means of supplying the buildings with water, appeared to be by pumping from the river in their immediate vicinity, it was decided, after a careful examination of the locality, that the most advantageous site for the necessary work would be on the river edge in the rear of the library, where the point stands furthest out into the current, and the purest water would most likely be obtained. The cliff being at almost all parts steep to the waters' edge, except at one place, where there was a small surface of flat rock, at a level of about 9 feet above low water, this was selected as the best position for the engine house. The pumps are driven by steam power.

From the engine house the rising main, 6 inches diameter, is carried obliquely up the face of the hill, in a trench averaging over 5 feet in depth, to the top, where it curves and runs nearly straight to the west end of the parliament buildings. It is then carried into a room in the basement of the north-west angle tower, where there is an arrangement of valves, curved pipes, etc., by which the supply to the several blocks is regulated.

The tanks are situated in the six angle towers, as high as the roofs will permit. They are 16 feet diameter at top, 15½ feet at bottom, and 9½ feet high, except the main receiving tank, which is 10½ feet. As each tank is capable of holding about 12,500 gallons, their aggregate capacity is over 75,000 gallons.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. T. TAYLOR, F.R.I.B.A., Montreal.
1ST VICE-PRESIDENT	J. F. PEACHY, Quebec.
2ND VICE-PRESIDENT	A. RAZA, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	E. MAXWELL, Montreal.

COUNCIL:

A. C. HUTCHISON	Montreal.
JAS. NELSON	Montreal.
J. WRIGHT	Montreal.
ROBT. FINDLAY	Montreal.
CHAS. BAILLAIRGE	Quebec.
F. H. BERLINGUET	Quebec.

AUDITORS—G. E. TANGUAY and H. C. NELSON, Montreal.

TORONTO BUILDERS' EXCHANGE.

THE annual meeting of the Toronto Builders' Exchange was held in the offices of the Exchange, No. 8 Victoria street, on Monday the 18th inst. The meeting was well attended, there being most of the leading builders and supply merchants present. The Finance Committee's report showed the finances to be in a satisfactory condition. The reports of the directors and the Legislation Committee were received and adopted. The following officers were elected for the current year: President, Mr. John Aldridge; First Vice-President, Thos. Cannon, jun.; Second Vice-President, John B. Vick; Treasurer, D. Williams; Directors, Jas. Crang, Wm. Booth, Jas. Wickett, Geo. Henry, J. M. Gander; Auditors, Messrs. George Clay and Frederick Holmes.

The Beamsville Paving and Pressed Brick Co., Ltd., have applied for incorporation, to continue and extend the business carried on since 1870 by Messrs. Tallman & Son. The proposed capital stock of the company is $50,000, divided into 500 shares of $100 each.

THE EVOLUTION OF ARCHITECTURE IN NORTHWEST CANADA.

By Chas. H. Wheeler.

ARCHITECTURE in Northwest Canada, particularly alluding to Manitoba and the adjacent territory, has undoubtedly passed its 'happy stage,' has gone through its teens, and is now only waiting to develop into vigorous manhood with the advent of settlers and capitalists.

The evolution of this important section of the fine arts in this part of the Dominion of Canada has been surprisingly rapid—not excelled even by the mushroom growth of some of the large Western cities of the United States.

Thirty or thirty-five years ago Winnipeg was an aggregation of log houses surrounding Fort Garry, an Hudson's Bay Company's post—the plains of Manitoba and the territories stretching away for nearly a thousand miles westward to the foot hills of the Rocky Mountains, uninhabited, except by Indians and half-breeds.

The year 1870 brought considerable changes. With the influx of settlers came an increased demand for comfort; the old style log-built buildings gave way to to the "balloon" structure—span roofed dwellings, a single chimney, the woodshed as an adjunct in the rear. Stores sprang up; plain frame churches were built, and lo! a city was formed. At this period architecture must be pictured in its primitive form, every man being his own designer and the level prairie his working foundation.

The ensuing ten years to 1880 was one of steady architectural progress, the closing period of this decade being marked by the near approach of the Canadian Pacific Railway, the opening out of stone quarries and the local manufacture of bricks, of which considerable use was made in many new structures.

From 1880 to 1883 a tremendous impetus was given to the building trades by the passing through the city and province of the above railroad, then reaching out its mighty iron tentacles towards the Pacific Ocean, creating that much-talked-about real estate boom which brought Winnipeg so much notoriety, and with it world-wide fame.

This was in verity a golden period for professional men, and, as a result, architecture received that attention due to one of the fine arts in the palmy days when money was plentiful, and clients kicked not at the percentage demanded.

During these years, and for two or three years afterwards, scores—literally scores—of architects, from all parts of the world, hung their "shingles" up to the light of day, and public buildings, churches, schools, stores and residences sprang up as if by magic. New streets were laid out, a system of drainage to the Red River put in, sanitary plumbing began to be thought of, scientific heating and ventilation was introduced, but—and it must be told—solidity of construction was not so much aimed at as the prettily got-up picture elevation to catch the eye of the "tenderfoot."

The creations of the Greeks, the Romans of Augustus' day, the monks and master masons of the middle ages, the Italian Renaissance, were repeated piecemeal, with the addition of redundant modern ornamentation on many of the buildings—imitations even of the early Christian basilica surmounted edifices utterly unsuited in style to its use.

It may be taken as a correct statement that profuse and overdone outside details in these days meant flimsiness in other ways—hence the trouble to-day in repairing and putting in stone foundations, bracing up and strengthening these very buildings. However, it is a pleasure to be able to praise quite a number of well-built and tastefully designed structures erected in those years, in which considerable attention was paid to proportion, symmetry, and fitness. Amongst the most prominent were the Hudson's Bay stores, post office, Holy Trinity church, St. John's college, Richardson block, Stobart block, the Jail, Court House, Legislative Buildings, and in succeeding years Wesley College, Baptist Church, new Court House, Ottawa Bank, Westminster block, Manitoba Hotel, Galt's, Peck's, Ashdown's Sanford's and the Massey warehouses, and many others.

Mulvey, Dufferin, Euclid and Argyle schools are good specimens of later day architecture; the Collegiate also is a substantial and creditable structure. All these schools are answering their purposes admirably.

Scores of fine residences have gone up since the boom years, more or less artistic in design, as the owners were possessed of the artistic taste and the money to gratify their wishes in building for the expression of ideas, and for beauty of form, instead of truckling to that spirit of commercialism which makes itself so unpleasantly conspicuous in these days of utilitarianism and race for wealth.

The town of Emerson boomed for a while at the same time as Winnipeg, and some handsome blocks were built. The town of Portage la Prairie and the city of Brandon were also created; the two latter places are flourishing to-day, whilst Emerson is in a decaying state.

The prominent buildings to-day in Brandon are the post office, most of the bank buildings, the insane asylum, hospital, Fleming block, etc.; at Portage la Prairie the jail, court house, home for incurables and Alloway and Champion's bank are amongst the leading architectural features. Morden, on the South Western Railway, is also a rising place with several handsome blocks.

Other towns on the North Western Railway could be mentioned favorably as regards architectural progress, and not a few of the numerous towns on the C. P. R. as far as Calgary are following suit. The village of Selkirk also possesses its well-built insane asylum.

Calgary is one of the prettiest places in the Northwest, and contains some well-designed blocks built of local stone.

It will not be denied by intelligent observers that the sister arts, music, painting and architecture, are closely allied—so close that should one of the sisters languish for lack of encouragement, the others droop their heads accordingly. This brings us without further circumlocution to the plain statement that, although money is said to be the root of all evil, it is absolutely necessary for the expansion of architecture as one of the fine arts, and that there should be plenty of it. Give the architects in the Northwest equal opportunities in this respect with their confreres in the East, and the artistic quality of their work would become immediately apparent. Even as it is, under somewhat unfavorable surroundings, very much has been done in establishing a higher plane in architectural proportion, skill in design, combined with solidity of construction, highly creditable to those professional gentlemen who have stood the heat and burden of the day, and are with us still.

The scope of this article is practically unlimited, but the space allotted to it by the editor of this journal is necessarily cramped. There is still much to say on many important matters, including a closer analysis of a number of blocks and residences not mentioned here at all. However, enough has been written to show that only in progress is there life; and that we are really progressing, but very slowly, is certainly true. It is fitting, therefore, to reiterate with increased emphasis, the statement that architecture in Manitoba and the Northwest is only waiting to develop into vigorous manhood with the advent of capitalists and settlers.

ONTARIO ASSOCIATION OF ARCHITECTS.

PROCEEDINGS OF ANNUAL CONVENTION.

THE annual Convention of the Ontario Association of Architects was held in the building of the School of Practical Science, Queen's Park, Toronto, on Tuesday and Wednesday of last week.

On the first day the President, Mr. H. B. Gordon, took the chair at 2.30 p. m., and called the meeting to order, there being then about a score of members present.

The proceedings were opened by the reading of the minutes of the last annual meeting, which were adopted without discussion.

PRESIDENT'S ADDRESS.

The President then proceeded to read the following address:

In welcoming you to this annual convention of the Ontario Association of Architects, it is not my purpose to weary you with a review of architectural progress during the last year. The hard times that have prevailed so long, still continue their depressing effect upon the number and size of our commissions. Works of any magnitude have been few, and the majority of architects have had abundant time for study and reflection. All experiences should have an educating influence, so we may expect the result of this lull in the exercise of our constructive powers to be a gain to our reflective faculties. May we also hope that when the wave of prosperity again makes us all very busy, there will be manifest a distinct improvement in our architecture. Out of the evil of dull times should spring the good of better preparation for a revival of business.

In our collective as well as individual capacity it is hoped that the lull has not been without its advantages. It has certainly afforded us ample time to reflect upon the weaknesses of present architectural practice and the possibilities of improving it by organization and united effort. In common with many other citizens, some architects are apt to say that they (meaning someone other than themselves) should get such and such laws passed, or do so and so in regard to the profession, and then things will be righted. They forget that all have their duty to perform in making efficient our present organization, and also all have their influence in seeking to secure further legislative action. As you are aware we very nearly succeeded in getting the amendment to our Act carried at the last session of the Legislature. Having passed the second reading, and to that extent having its principle affirmed, it was referred to a special committee nominated by the Speaker of the House. Owing possibly to the personal opposition of the Speaker, on this committee there several members who were opposed to the Bill. Thus, while the mover and seconder and the Minister of Education spoke strongly in favour of the proposed amendments, the forces for and against were so evenly balanced that it was thought inadvisable to press the matter to a vote at the risk of defeat. The Bill was reported back to the House on the understanding that it be withdrawn for that session.

From the necessary interviewing of members of the House, we gathered that the object of the amendment was much better understood than formerly, and that our cause had gained many new friends. With few exceptions the only opposition on the part of members arose from an anxiety as to how such a measure might be viewed by some of their constituents. Not that there can be any reasonable ground for objection when the measure is understood, but they seemed to fear that country builders and others might conclude that the passage of the amendment would limit their practice and ultimately lead to the compulsory employment of architects.

We wonder how any such idea could arise in the mind of anyone who carefully reads the proposed amendment. Everyone will be as free after the passage of the amendment as before it, to draw plans for themselves or for others, and make such charges as they desire. No man's livelihood will be restricted in the least The only point of limitation will be, that a man cannot call himself an architect when he is not one. It is a question of common honesty, and all who are opposing the amendment are either consciously or unconsciously assisting in perpetuating a fraud upon the public.

It is far more in the interests of the public than in those of present practising architects, that some compulsory educational standard should be set up. It is distinctly to the interest of the public that architecture should be improved. It is the art whose productions are constantly before the eye; the one whose practice most intimately affects the health and comfort of the people, and the one whose judicious use of materials is so necessary for the wise investment of capital. As we cannot have good architecture without well-educated architects, and as some compulsory standard of education is necessary to ensure that architects be well educated, the public in their own interests should desire the passage of the amendment to our Bill.

There is reason to believe that the educational campaign carried on by the Association for the last few years will bear fruit in the passage of our amendment at the next session of the Legislature. In order to accomplish this, however, the Association must make a united effort, and the committee who press the matter before the Legislature must not be met with reputed quotations from members of the Association, and even Council, opposing the amendment.

The passage of our Bill most unfortunately implies the necessity of taking into the Association all now practising architecture who desire to call themselves architects. Thus the status of architecture in Ontario will not immediately be advanced. The benefits from this legislation will probably only be felt 10 or 15 years hence. This is one of the best evidences of the personal disinterestedness of its present promoters, and the fullest answer to all who may suspect some hidden benefit to a chosen few. As artists we desire to uplift our art; as patriotic citizens we want to advance our country.

Meantime we might consider whether the gaining of some present title of distinction indicating educational standing and proved architectural ability might not be a desirable stimulous to those in the Association.

In the Royal Institute of British Architects there are three grades of membership, viz., Fellows, Associates and Honorary Members. The first two (except in special cases) have to pass examinations before they are privileged to use the title of distinction. Thus the affix of A. R. I. B. A. means something to a British architect and gives him a definite standing before the public.

Possibly it might be well for us to make a distinction in our membership. For instance, it seems but reasonable that those young men who have passed the Association's examinations should be placed on a higher level than those who have come in merely because in some manner or other they have been practising architecture at the time of legislative action.

It is also evident that young men who have only recently passed their examinations should not be placed in a higher grade than older men who have spent a score or more of years in the honorable practise of their profession and whose works are a testimony to their ability.

The inauguration of any system of degrees is beset by difficulties, but if the general idea met with approval, no doubt some practical method of arranging the matter will be suggested. It might be possible to have the ordinary members distinguished by a simple O. A. A.; those who have passed the examination and thus become graduates, distinguished by G. O. A. A.; while the older men, whose work and position in the profession justifies the honor, might, by recommendation of the Council and vote of the convention, be elected to the position of Fellows, with the right to add F. O. A. A. to their names.

Apart, however, from all legislative action or degree conferring enactment, it is possible for each member of this Association to do much for the elevation of the practice of architecture in Ontario. During the business depression that has been resting upon the country there has been a strong temptation to even honorable men to adopt the canvassing agent's methods to obtain work. This is bad enough even when the solicitor confines himself to the praises of his own wares; but generally any departure from the recognized professional methods of conducting our business is apt to land the transgressor in the position of slandering his competitors and trying to steal their jobs. Such unprofessional Ishmæls may be found even in Ontario; and it becomes every member of this Association to not only abstain from every appearance of this evil, but also to keep alive a sentiment that will condemn all such reprehensible conduct.

There are men who will act honorably under all circumstances; there are others who will act honorably if under good influences and surroundings; our duty is to create such surroundings. To this end the society spirit should be fostered amongst us. The members of the Association should meet more frequently for mutual edification. The geographical distances between our homes is so great that more than one general meeting of the Association each year seems impracticable; but there is no reason why in several local centres there should not be associations or chapters meeting once a month. The Toronto members have realized the importance of this idea, and a committee purpose placing before you for discussion and approval a general scheme for the establishment of local chapters. There is no reason why the chapter idea should not find fulfilment in several places in Ontario. Some may say that local jealousies and conflicting interests are such as to make the practical carrying on of a chapter impossible. Rather let it be said that because of such local difficulties the need of a local chapter is all the more urgent. To meet for discussion of matters of mutual interest is the best way of dissipating distrust and inaugurating mutual forbearance and respect; then there is the distinctly educational advantage of such chapters. The man who thinks he has nothing to learn from his professional brethren is to be pitied for his blindness. There are many things we cannot learn from books and those who have experienced the helpfulness of interchange of opinion with their architectural brethren know that many of their best ideas owe much to such association.

Besides the ethical and educational advantages of such chapters, there is their distinct influence in elevating the profession in the eyes of the public. So long as architects disparage one another and run after one another's clients, so long will the public estimate architects generally by the lowest standard we set up. But let the profession in any town show a united front, help one another professionally and uphold one another's reputation, the public will adopt a high standard in its opinion of the individual architects. Such chapters would form a local authoritative body on all public questions associated with architecture. They would be ready to assist in the formation or amendment of local building laws. They could deal with local competitions. They might negotiate with local bodies of builders and others and give seasonable advice upon all matters pertaining to building.

All this would benefit the individual architect, would help the

Ontario Association of Architects, and would tend to elevate and improve architecture in Ontario.

Besides our duties along these social and business lines, it becomes us to strive personally to advance the truly art side of our profession. This is as urgently needed as the other. Scientific data may be obtained from books ; art education can only be satisfactorily attained by association, criticism and suggestion. I am well aware that no amount of education can make an artist if the original qualifications be absent. I am equally convinced that no architect can satisfactorily develop without the favoring circumstances of association and criticism. True, he may study classical and gothic models and be able to reproduce on paper many of the best architectural triumphs of the past. But the subject before architects is not reproduction but adaptation. The building problems of to-day are so hampered by social requirements and unbending commercial interests, that the old academic rules will not strictly apply. The study of the classic orders is not that the architect may reproduce a temple with all the proportions strictly after Vignola or some other authority, but rather that he may adapt them to the modern conditions of a classical street front. The vigorous and varied forms of gothic architecture are studied, not for the purpose of exact reproduction, but rather to see how much of them can be engrafted on the modern building with its arbitary requirements. The study of the history of architecture is not along archeological lines, but rather that a comprehension of the motives and principles that found their expression in stone and brick may serve to solve present problems. Such is the practical trend of the age, but there is no reason why it should be divorced from the truest art. The bars have been let down, but that is no reason why architects should run riot with all architectural forms. The principles of true art remain unchanged, though the form of their expression must necessarily alter with our changing civilization. And it is just those principles that are hardest to define that are most necessary of conservation. And it is the application of those principles to present problems that the architect most needs. This is something he cannot learn from books nor evolve from his own consciousness. It can only be learned from the mistakes and successes of others. Even then it can only be truly learned as he looks at these mistakes or successes through the varied lenses of other architects' opinions. How many of the eccentricities of budding genius might be prevented by the sober contemplation from another's standpoint of the self thought brilliant solution to some architectural problem. How many offensive mannerisms in design might be corrected by a little advice from those whose trained eyes analyze the defect.

The very freedom which we claim on the ground of our modern requirements and modern building material is becoming a license to perpetrate architectural sins.

Plate glass and steel construction have so modified our limitations as to voids and solids that we are apt to forget the artist in our homage to the engineer. Old fashioned rules of proportion are ruthlessly swept aside, and as if to match the constructive change, the salient points of the engineering triumph are hung with detail and decoration that defies all rules of adaptation or suitability.

No one will deny that there must be necessary changes in our ideas of general massing and the relation of solids to voids, to meet the pressing requirements of modern conditions. But there is no reason why the realm of detail should be so ruthlessly invaded or its past examples so persistently miscopied and misplaced. Competent critics of modern architecture generally put their finger on this weak spot, and I think I may safely state that a remedying of this is one of the crying needs to which Ontario architects should address themselves. To see and recognize our deficiency is a long way towards its remedying.

The correct proportion of any classic detail may be copied from a book, but the suitable incorporation of a detail and the appropriate use of an ornament is a much more difficult matter. A post graduate course by Ontario architects in the colleges of local chapters, under the curriculum of friendly criticism and suggestion, seems to me one feasible way of finding its solution.

There is another matter that affects the estimation of our profession in the eyes of the public, and that should receive some attention from us. Any who have been called upon to give expert testimony in courts must have observed the great divergence, and even direct contradiction, of experts in their evidence ; and as a result, the very little weight that a judge gives to their testimony. The public distinctly discounts all expert evidence, and many go to the length of stating that they can hire professional experts to give any kind of evidence they like. This is very humiliating to the individual architect, and distinctly derogatory to the reputation of the profession.

An architect should of course at all times exercise a judicial mind and seek to do justice to all concerned. This, I am glad to know, is the ruling principle with a very large number of our Ontario men. Their differences of statement in the witness box arise more from the method of questioning by the examining counsel than from any intention in mind or purpose. Indeed, a very conscientious man is put to great inconvenience by the ingenious method of stating or mis-stating fact to which he is expected to give an affirmative or negative answer. Also, the manner in which the case has been previously stated to the witness forms a strong bias in the mind of even a cautious and reflective man. But unfortunately, cautious and reflective men are not in demand as professional experts for court cases, but rather those who can be most easily enlisted as advocates of the side they are engaged to support.

Thus a distrust of professional evidence has arisen ; honest men when called upon to testify are humiliated by having their statements discounted, and the whole status of the profession is lowered in the eyes of the public.

The only adequate remedy appears to be in having the experts appointed and paid by the courts to make disinterested investigations and reports. Such is the case in France. Certain members of the profession are designated by government as architectural experts, and the judge of any case can avail himself of their help in determining any matter requiring technical knowledge or experience. Some steps should be taken to secure similar legislation in Canada. A committee appointed by this convention could co-operate with one from the Society of Civil Engineers and any other body interested in having the abuse remedied ; it being understood that no legislative agitation on any subject other than our important amendment be commenced until our association has gained its point, and it becomes unlawful for anyone to begin masquerading as an architect under such a title without the necessary educational qualifications. This is the present desirable goal to which our activities must strive. From now until the next legislative session rises, all legitimate influence must be exerted to carry our Bill. Every member of the association must do his part. Builders, manufacturers and others engaged in building interests must be seen, our case fairly stated to them, and, if possible, their sympathy and co-operation secured for the passage of the Act. They are regarded as men who take a practical view of the matter, and their influence with many of the members of the House is considerable on such matters as affect building or architecture. Any misapprehensions that have arisen must be explained, and the fullest light of investigation turned on the proposed measure. Our cause is so manifestly just and in the interests of the public, that our best policy is the courting of the fullest investigation.

TREASURER'S REPORT.

In the unavoidable absence of Mr. Burke, the Treasurer's report was read by the registrar, Mr. Langton :

THE TREASURER IN ACCOUNT WITH THE ONTARIO ASSOCIATION OF ARCHITECTS.

1896.	DR.	
Jan. 1.	To balance from 1895	$1,644 80
Dec. 31.	Members' annual fees	271 00
	Members' registration fees	30 00
	Students' registration fees	12 00
	Students' examination fees	9 00
	Sale of examination papers	0 75
	Transfer of articles	1 00
	Interest on Treasurer's bank account	46 00
		$2,014 75
1896.	CR.	
Jan. 2.	By W. A. Langton, balance of salary for 1895	$150 00
Dec. 31.	W. A. Langton, salary for 1896	300 00
	W. A. Langton, general disbursements	62 37
	Crombie, Worrell & Gwynne, legal services	28 50
	Printing reports, circulars, etc.	60 55
	Printing examination papers	25 00
	C. H. Mortimer, subscriptions for CANADIAN ARCHITECT for 1894-95-96, sent to three British Architectural societies	22 50
	C. H. Mortimer, reporting convention	12 50
	Harry Webb, Convention lunch	14 00
	General stationery	16 90
	Caretaker School of Practical Science, re Convention and Examinations	15 00
	A. H. Gregg, attendance at Examinations	15 00
	Books added to Library	16 00
	Total disbursements	$ 738 32
	Balance on hand	1,276 43
		$2,014 75

We have examined the books and vouchers of the Association, and certify that the above is a correct statement thereof.

HENRY LANGLEY,
WM. R. GREGG.

The Treasurer, in submitting the accompanying statement, would explain that while the total disbursements are $265.79 more than last year, the present account includes a proportion of the Registrar's salary amounting to $150.00 which should be charged to 1895. Last year had other outstanding accounts amounting to $33.63, while this year $3.00 will cover this item. Considerable extra expenditure was also involved this year for printing in connection with our efforts to secure legislation. Three years' subscription for the CANADIAN ARCHITECT, which was sent to three British architectural societies for the years 1894-95-96, and amounting to $22.50, was paid this year. Attention is called to the fact that our balance is still decreasing, owing to the fact that a large number of fees have not been paid for several years past. Our balance in the bank is $368.47 less than it was at this time last year.

On motion of Mr. Power, seconded by Mr. Fuller, the report was adopted.

REPORT OF REGISTRAR AND LIBRARIAN

The Registrar then read his own report :

REPORT OF REGISTRAR AND LIBRARIAN AT THE ANNUAL MEETING ON JANUARY 12TH, 1897.

MEMBERS.—The number of members on the roll is the same as last year, viz., 132. There have been two new registrations, but also a death and a resignation.

STUDENTS.—There has been one student registered. The examinations were held in March. The Board of Examiners were

the same as in 1895, viz., Prof. Galbraith (Chairman), Messrs. C. H. C. Wright, M. B. Aylsworth, R. J. Edwards, W. R. Gregg, Grant Helliwell, W. L. Symons, S. H. Townsend and A. F. Wickson. There were six candidates for examination :—For the first intermediate, 2 candidates, of whom 1 passed ; for the second intermediate, 3 candidates, of whom 1 passed ; for the final, 1 candidate, who did not pass. There were also 4 candidates for examination supplementary to the examinations of the previous year. These, except 1, were successful.

LEGISLATION COMMITTEE.—The Bill to amend the Act of Incorporation was introduced again in the Legislature. Copies of the Bill, with notes explaining the emendations, and in particular, pointing out the essential amendment in the section in which occurs the title "Registered Architect" which it is proposed to change to "Architect," were sent to all members of the Legislature. Personal interviews were obtained with the bodies forming the different parties in the House. The Cabinet expressed themselves in favor of the amendment ; the leaders of the Conservative party, at a meeting of the party, and with the apparent intention of speaking for the party, expressed themselves in favour of it ; the Patrons went into the matter very carefully, particularly in the question of fees, and when these were fixed as part of the amendment they expressed themselves in favor of it. Mr. Garrow, a member of the Liberal party whose opinion is respected on both sides of the House, agreed to move the amendment, and with the exception of a few of the more prominent men in that party it was not thought necessary to canvass opinion further on the Liberal side of the House. The Bill passed the second reading without opposition, and was referred to a special committee appointed by the Speaker. The Speaker was himself strongly opposed to the Bill, and as we were informed both by members of the committee and by the Speaker himself, took pains to personally impress his view upon members of the committee. Whether from this reason or not, a majority of the committee proved to be hostile, and it was considered necessary by Mr. Garrow to make a compromise, the Bill being passed by the committee on condition that it should be subsequently withdrawn in the House. The adoption of this method of rejection as the least injurious to the reputation of the Bill if it should be brought up again, may perhaps be taken as an encouragement to believe that the members of committee who joined in rejecting the Bill would be willing to consider the arguments in its favor if it should come up again when the country was ready for it. There is no doubt that a great deal of misconception exists in the country as to the effect the amendment would have upon the business of builders ; and there is reason to believe that members of the special committee received protests against the Bill from the country, and that they came from persons of this class. The Council having in view the general favor shown to the Bill in the House, and the special circumstances connected with the opposition which caused its withdrawal, see no reason why the Bill should not be introduced again this session.

STANDING COMMITTEE ON BUILDING BY-LAWS.—This committee met for the purpose of further establishing its work and will present a report to the Convention.

THE LIBRARY.—The following books have been added : Kerr's English Gentleman's House, Architecture for General Readers by T. Heathcote Statham, A History of Architecture by Prof. Banister Fletcher and Banister F. Fletcher, A History of Architecture by A. D. F. Hamlin, and a second copy of Mitchell's Building Construction, Part 1. Presentations have been received of a volume of sundry works by Mr. Chas. Baillairge, of Quebec, and of the Proceedings of the American Institute of Architects since Consolidation in 1889. There have been 102 lendings from the Library.

On motion of Mr. Henry, seconded by Mr. Gregg, this report was also adopted.

REPORT OF COMMITTEE ON BUILDING BY-LAWS.

The President next read the report of the Committee on Building By-laws :

GENTLEMEN :—Your committee met and considered the best methods of advancing the inauguration of suitable building by-laws in municipalities in Ontario, and securing amendments to existing building enactments.

We first endeavored to secure all the useful information available concerning existing building laws in the leading cities of the world. We wrote to a number of cities in America, Europe and Australia, asking for copies of their building by-laws, and in reply have received copies of a number of building enactments. A study of these, together with the report of the former committee in regard to Toronto building by-laws, places your committee in possession of a great deal of valuable information that may be available in counselling municipal officers and others concerning building enactments.

We resolved to ask the convention to appoint a standing committee on the question of building by-laws and to instruct such committee to communicate with the various municipal officials throughout the province, apprising them of the existence of such a committee, and suggesting the desirability of consulting with its members for the compilation or amendment of building laws suitable to the respective localities.

We think it desirable that such standing committee should have a corresponding member in all cities and towns where there are members of this Association ; and thus through their local number stimulate municipal officials to action in the matter of suitable building laws.

We also think that such a committee should obtain through its corresponding members or otherwise, correct information as to the present condition of building by-laws in the various towns and cities of Ontario, and if possible secure copies of all such existing laws.

We are of opinion that a standing committee of this convention possessed of such knowledge and experience, would be consulted by those who are contemplating either new by-laws or amendments to existing ones.

Such consultations would probably result in much better building enactments being passed than otherwise would be possible, and as a consequence improvements in methods of building.

While the assistance proposed to be offered by such a committee might entail considerable labor upon its members, we believe that the ultimate benefits to the profession would be such as to justify the self sacrifice.

We also think that if this scheme is approved by the convention, the standing committee should seek the co-operation of the Association of Fire Underwriters, and also that of the various Boards of Health in furthering the enactment of better building laws.

Submitted on behalf of the committee.

H. B. GORDON, Convener.

The following is a suggested form of circular letter to be addressed to the municipal officials :

SIR,—The convention of the Ontario Association of Architects being impressed with the desirability of securing more definite and suitable building enactments in the various municipalities of Ontario, have appointed us a standing committee of that body for the furtherance of this object.

We have secured copies of the building by-laws of a number of American and European cities, and have instituted a study and comparison of the same. We have obtained information regarding the present unsatisfactory condition of existing building by-laws in the various Ontario municipalities, and have noted the many desirable matters for enactment suitable to places of varying population and situation.

Our object is to improve the standard of building in Ontario by such enactments as shall conserve the stability of structures, the healthiness of dwellings, the safety of buildings for public assembly, and the minimum of fire risk. These desirable ends we believe can be secured without hampering the operations of any skilled constructor or entailing additional cost that would prove burdensome to capital.

The information we possess we are willing to place at your disposal for the purpose of inaugurating or amending a system of building by-laws suitable for your locality.

You will of course, understand that this offer is limited to such counsel and advice as the committee can give you by correspondence.

It was moved by Mr. A. E. Paull, seconded by Mr. Gray, that the report be adopted.

Mr. Paull remarked that the matter dealt with in the report was one that demanded a great deal of consideration. When the President was reading it he (Mr. Paull) thought that it was rather limited in its scope, being apparently confined only to the matter of the erection of buildings. It left out a number of very important matters which he (Mr. Paull) thought should be dealt with in a building by-law—matters which might be considered municipal. For instance, in the City of Toronto, take our streets. In Toronto there are many streets which are very narrow, and the principle has been adopted of building houses on such narrow places that sanitary arrangements cannot be properly carried out ; the result being, although it may not always be made apparent that the longevity of the people living on them is very much less than it would be if the streets were carried through at a good width. There were many parts of the city of Toronto now—notably up in Yorkville—where you will find there is no more than just enough room in front of the houses for a donkey cart to pass through ; and those houses are now all unoccupied. In a report of this kind the question of the provision of proper parks and playgrounds ought also to be dealt with.

The President : There is a Standing Committee of this body on the question of the improvement of cities, appointed at the last convention. I suppose the remarks of Mr. Paull would bear upon that topic.

The motion was then put and adopted.

It was moved by Mr. Gregg, seconded by Mr. Gray, that the Committee on Building Laws be continued as at present constituted, but with power to add to their number corresponding members in various places. Carried.

Mr. Gregg remarked that he believed there was no report from that other Standing Committee ; but he moved that it also be continued. He thought there was scope for it all in the line in which Mr. Paull had spoken as well as in a good many other lines ; but of course its work was quite a different thing from that of

a Committee on Building By-laws. For instance, it was proposed now to extend the Toronto Street Railway along the lake front to the Island. They might have an opinion, in that connection, as to how the Island should be laid out; and for that reason alone he thought they should have the Committee on Municipal Improvements continued.

Mr. Langton said that the Committee was appointed in 1894-5, and consisted of Messrs. Billings, Baxter, D. B. Dick, W. R. Gregg, Post and Aylesworth; and last year it was moved by Mr. Gregg and carried that the Committee be continued with powers to add to its numbers. He (Mr. Langton) seconded Mr. Gregg's motion that the Committee be continued with power to add to its numbers.

Mr. Gregg: What is the name of that Committee?

Mr. Langton: It is called the Committee on Municipal Adornment.

Mr. Paull remarked that the Committee might bring forward something next year.

Mr. Langton suggested that Mr. Gregg be the Chairman of the Committee, and with this embodied, the resolution was declared carried.

The Registrar then read a letter from the Secretary of the Am. Inst. of Architects saying that he had had enquiries from Canadian architects as to the possibility of entering the American Institute, and asking if the Ontario Association desires connection with the American Institute, and also a letter from the Secretary of the Province of Quebec Association asking for co-operation of the Ontario Association in the establishment of a Dominion Institute.

Mr. Gregg said that he supposed that if there was an affiliation it should be between a Dominion Association and an American Association. He did not go into the question as to the desirability of affiliation at present, but simply moved that it be left in abeyance pending the consideration of the question of the establishment of a Dominion Association.

Mr. Simpson seconded the motion, and it was declared carried.

The President: Now we have the other question, with regard to the Dominion Association.

Mr. Simpson asked to what legislature would they have to apply for their bill in case all the provincial associations decided to amalgamate. Would their bill have to go to the Dominion House or through the several local Houses?

The President said it would depend altogether on what they were asking for.

Mr. Simpson: Well the same as we are asking now from the Provincial House.

The President replied that he understood the matter of the regulation of the professions in the various provinces was in the hands of the Provincial Legislatures. There might be a sense, however, in which the Dominion House might exercise an authority of which he was not cognizant.

Mr. Simpson said that the reason he asked was that it occurred to him that if amalgamation took place there might be a possibility of their getting the bill through the Dominion house which they might not succeed in getting passed through the Provincial House.

Mr. Gregg said that he saw one advantage that might result from having a Dominion Association: that was, that such an association would be in a better position than they were to deal with the question of duties on plans from other countries—to deal with it better than it had ever been dealt with in the past. If they were to have a tariff in this country, it should be fully enforced as regards foreign plans, but this had never been done hitherto.

Mr. Langton did not think they were in a position to know what the proposition meant. They did not know whether the carrying of it out would help or hinder them in obtaining the legislation they were now asking for. As far as they knew at present professional associations were incorporated by the local legislatures and not by that of the Dominion; so he supposed this Association should also seek for incorporation from our local legislature. They were so far without the suggestions or notes which the President of the Quebec Association had promised should be sent to them. The question as to the duty on plans was an interesting one; but it was not the most important question they had to deal with. It alone was not sufficient reason for desiring to have a Dominion Association.

Mr. Henry remarked that the formation of a Dominion Association would not prevent the existence of local associations working under their own Acts.

Mr. Langton said he had thought there would be difficulty in carrying on two associations.

Mr. Henry suggested that they communicate with the Quebec Association for the purpose of finding out more definitely what their proposal was.

Mr. Darling said he would like to know what effect amalgamation would have on the course they were now pursuing. He thought they might continue as at present, and at the same time make enquiry of the Quebec people what they meant. He thought that at present this Association had its hands full enough. He would certainly be very averse to merging it in a Dominion Association.

The President: As I understand, the purport of Mr. Henry's motion is simply that we ask for further information before doing anything. Is that it?

Mr. Henry: Yes. I quite agree with Mr. Darling that our efforts should all be concentrated on the one thing, the securing of legislation here.

Mr. Power thought a resolution was hardly necessary. In the first place, it was scarcely a suggestion even that they were dealing with. They had not got the information that was spoken of in the communication that had just been read. He thought it would be a decided mistake to do anything in the matter until they had that information; and even if they had the information it would, he thought, be unwise for them to undertake anything more than they had under way at the present time. He could not see that amalgamation would help them much just now, and it might do them a good deal of harm. He thought they had better just centre their efforts on what they had under consideration at present, and when they got the further information that was spoken of in the letter they could discuss the matter further.

The President: Has anyone got a motion, then? (No one responds.)

The President: Then we will pass on to other business. Seeing that we have arrived at that stage, I suppose we are now in a position to consider the proposition from the American Institute.

Mr. Gregg said that when he made his motion he had not had the least idea that a Dominion Association could be arranged for within this year, and he thought that a Dominion Association would be the proper body to receive and consider such a suggestion as that coming from the American Institute. That body being a national one, it would not, in his opinion, be proper that affiliation should take place between it and an association which was merely provincial.

Mr. Currie thought, nevertheless, that the American Association should receive an answer from this Association in reply to their suggestion. How could this body affiliate with the American Institute? He understood that the latter had themselves offered no suggestion as to how to bring the thing about. For himself he saw no reason why an association in this country should not be in affiliation with one in the States. In joining the latter they need not necessarily throw up their own organization. If some way could be arrived at by which this Association could become affiliated with that of the United States, and by which they could derive the benefit which must constantly result therefrom, he thought it would be a very good thing. He saw no reason why there should be a dividing line between the architects of the United States and the architects here. At the same time, he was entirely in favor of maintaining their own association. In any case, he thought such a suggestion coming from the American Architects Association should receive a courteous answer.

Mr. Darling said there was no question the communication from the American Association should be courteously answered; but as to endeavoring to carry out affiliation with them, he saw where difficulties would crop up. For instance, they had just heard a proposition with regard to legislation for the purpose of keeping foreign plans out of the country.

Mr. Power moved that in the opinion of this meeting an international association would not be advantageous under present circumstances, and that the Registrar be instructed to reply to this effect to the Secretary of the American Institute of Architects.

Mr. Darling seconded the motion.

Mr. Power's motion was then put and carried.

Mr. D. B. Dick said that a matter had been put in his hands to bring before the convention. Some little time ago a suggestion was made—by whom he did not exactly know—that there should be a chapter of the Association formed in Toronto. Two or three meetings of the Toronto members of the Association were called, and he thought some twenty or twenty-five members attended them.

Mr. Langton remarked that thirty-two members had assented to the proposition; some had done so by letter.

Mr. Dick went on to say that the upshot of the matter was that a committee was appointed—of which he (Mr. Dick) was convener—to consider the question and report as to what should be done. The report which he held in his hand was prepared and submitted at the last general meeting of the Toronto members of the Association, and approved of; and the committee was continued and instructed to take charge of the matter at this convention. He would now read the report. (Reads.)

The committee appointed at the meeting of the Toronto members of the O. A. A., held on Dec. 16th, to consider the question of forming a local chapter of the Association, beg to report as follows:

That they are of opinion that the proper course to pursue will be to lay before the convention a proposition looking to the formation of local chapters throughout the province wherever desired by a sufficient number of members residing in one municipality or within a reasonable distance of it. To carry out this idea it appears only to be necessary to add a few by-laws to those passed by the Association, as your committee consider it desirable that each local chapter should have the utmost freedom in regulating its own affairs in whatever way the members consider most suitable to their local circumstances.

Your committee are also of opinion that a prominent feature in the establishment of a system of chapters should be that each chapter should have the benefit of all the papers read before the others, if they desire it. In this way the larger chapters would be of material assistance to the smaller ones, and the benefits to be derived from membership in the Association would be distributed more equally over all the members throughout the province.

The following by law, consisting of five clauses or sections, is submitted as containing all that is necessary to accomplish the desired end:

PROPOSED BY-LAW.

1. The Association shall encourage the formation of local associations to be known as Chapters of the O. A. A. Any five members of the Association may apply to the Council for permission to form a chapter with headquarters in any city or town which they may select, and such permission shall be granted by the Council if it is found that the territory proposed to be covered by the new chapter does not encroach upon that of any existing chapter. If any question of encroachment should arise, it will be determined by the Council at their discretion.

2. Members of chapters must be members of the O. A. A., but no obligation shall rest upon any member of the O. A. A. to become a member of a chapter unless he desires to do so. Chapters may establish a grade of associate members and may elect honorary members, but no practising architect shall be eligible either as an associate or honorary member. Associate members shall not be eligible to any office and shall not be entitled to vote.

3. Each chapter shall have power to fix its own dues and make such by-laws as it may think necessary and desirable, so long as these do not conflict with the constitution and by-laws of the O. A. A., of which point the Council shall be the judge, and for this purpose the by-laws proposed to be adopted by any chapter must first be submitted to the Council for approval.

Whenever a paper shall have been read at a meeting of a chapter, the secretary or other officer of such chapter shall notify the Registrar of the Association of the title of such paper, and he shall in turn notify the proper officer of each of the other chapters. On receiving a request from any chapter for the use of a certain paper, the Registrar shall communicate with its author, asking for the loan of the paper, and upon receiving it shall forward it to the chapter desiring it. This chapter shall arrange to have it read at a meeting by one of its members, and as soon as possible thereafter shall return it to the Registrar, who will forward it again to the author.

5. Each chapter shall report annually to the Association the number of members on its roll, and if at any time the number shall fall below five the Council of the Association shall declare such chapter no longer in existence.

Signed on behalf of the Committee,

D. B. DICK, Convener.

Toronto, 24th Dec., 1896.

After reading the report, Mr. Dick said he hoped gentlemen would discuss this matter, and not pass this report by any means merely as a matter of courtesy. He asked them not to pass it if they did not feel that these chapters were desirable. He was sorry there were so few of the Toronto members present. He did not think it looked very hopeful for the success of the chapter that of the sixty members of the Association residing in Toronto there were so few that took sufficient interest in the matter to show it by their attendance here on this occasion. He moved the adoption of the report.

Mr. Harper seconded the motion.

Mr. Gregg said that he very strongly approved of the general principle of the thing. They had heard that thirty architects in Toronto favored it, and said that they would become members of a Toronto chapter. He did not think there was anything discouraging in that.

The President: Thirty-two.

Mr. Gregg said that generally half the people that should take an interest in such a thing did not do so. These thirty-two were probably all the men that had ever taken an interest in the convention, and they did not propose to drop the convention because certain members in Toronto did not pay them a visit once a year. He thought the larger proportion of the men who were taking an interest in the Association were Toronto members. He thought there should be a chapter formed here, and he thought that when it was formed other chapters would be formed in other places. Other places would feel the need of such a thing. He heartily approved of the principle, and would move that they adopt the principle and consider the clauses of the report.

Mr. Power thought there were two sides to the question. He would like to see more interest taken in the matter both in Toronto and outside. They had only to look around them in order to see the amount of interest that was taken in the Association itself in which they were all supposed to feel an interest. He should be afraid that if a chapter were formed and carried on in Toronto it would to some extent take away from the interest felt in the Association; and he was afraid that at this juncture they could not afford to take any such chances as that. Not long since they had a greater number coming forward and showing their interest in this Association than they saw present to-day. He thought that until this Association was put on a better footing it would be a mistake to proceed with the chapter idea. He did not wish to go against the suggestion in any way. If there was sufficient interest felt in it to assure its being carried on properly here, all right; but he doubted it.

Mr. Simpson asked if the matter could not be allowed to stand until the next day. He thought there were a great many members who did not expect very much to take place on the first day of their meeting, and who on that account did not attend until the second day. He knew there would be quite a number more of the Toronto members present on the following day, and he thought there would be more from outside also. He moved the adjournment of the discussion until Wednesday.

Mr. Darling seconded this motion, and it was carried.

The rest of the afternoon was occupied in the exhibition and discussion of a series of stereoptican views of designs by members of the Association. At six o'clock the convention adjourned until the following day.

On Wednesday morning at ten o'clock a visit was paid to the new City Hall under the personal conduct of Mr. Lennox, the architect. There was a great deal to be seen and, in spite of the cold weather, the party visiting the works were unwilling to leave as early as had been intended, so that it was about half-past twelve before the Convention was again called to order. A number of members were in attendance who had not been present on the first day.

Mr. Langton read a paper upon "Principle in De-

sign," which, with the discussion that ensued, must be omitted for want of space.

Mr. D. B. Dick read the following paper:

THE POSSIBILITY OF A NEW STYLE OF ARCHITECTURE.

It is now some 350 years since the last living style of architecture reached its culminating point and began to fall away into decadence. These last 3½ centuries have been in some respects the richest in the world's history. Greater progress has been made in discovery and invention in every department of science during these 3½ centuries than had been made in the preceding 30 centuries. And yet, strange to say, during this last period—which has been so fruitful in the advancement of science—there has nowhere been in existence a true living style of architecture; while during the whole time that elapsed, from the earliest dawn of the art to the beginning of this period there has never been a time when there was not being practised somewhere in the world a living and growing style.

This fact, however, is sometimes stated in such an exaggerated form as to lead to the very erroneous conclusions that nothing worthy of the name of architecture has been done since the middle of the 16th century, and that everything that was done before that time was good, and everything that has been done since must necessarily be bad. This is far from being the case. But critics seem often to lose their critical faculty when they are dealing with old work, and speak of it reverently and almost with bated breath, merely because it is old. This spirit sometimes leads them to profess admiration for examples of old work, which, if they were the work of modern architects, these same critics would at once condemn and hold up to ridicule. There has been a vast amount of architecture produced during this last period, and much of it has been good and some of it excellent. Nearly the whole of the architecture of the Renaissance belongs to this period.

But while this is true it is also true that there is a radical distinction between architecture which is living and that which is not living. A living style contains within itself the elements of growth along the same lines on which it has arisen. As new conditions arise and new problems present themselves, new forms are evolved by a natural process of development from within. This process goes on slowly and gradually. There may be no apparent break in continuity, and no abrupt step anywhere visible, and yet it is found that after the lapse of a certain time the style has wholly changed. In short, a new style has been invented. But after a style has ceased to be a living one such growth as this never takes place. Its features and forms may indeed be used with academic correctness, and may be adapted to new situations and purposes. As a new need arises another old feature will be taken and ingeniously made to serve the new purpose. But a style may be made use of in this way for an indefinite length of time without making any advance beyond the point which it had attained while it was still living and growing, because this method is simply imitative and eclectic.

At this point the question "what is style?" seems naturally to arise. Very few writers have made any attempt to give an explicit definition of the term, but have contented themselves with recounting the history and describing the features of the various styles and pointing out the differences between one and another. Such definitions as have been made are more or less unsatisfactory and may convey different meanings to different minds according to their individual predilections and the character of the architectural objects with which they are familiar. Owen Jones, for instance, says in his preface to the "Grammar of Ornament:"—"Architecture is the natural expression of the wants, the faculties, and the sentiments of the age in which it was created." "Style in architecture is the peculiar form that expression takes under the influence of climate and materials at command." Both these statements are true so far as they go, but as definitions they do not appear on one hand to cover the whole ground and on the other they seem to claim almost too much. Here is an attempt at another definition:—"Style in architecture consists in the harmonious working out of the construction and ornamentation in a manner so characteristic that the period and locality of the erection of original examples can be determined (by comparison) from the evidence which they themselves furnish."

All true styles will be found to fill these conditions no matter how much they may differ from each other, either in method of construction or character of ornamentation. The number of true styles into which the architecture of the world may be classified is wonderfully small considering the length of time over which they extend, and the variety of conditions under which they were produced—conditions varying with the purposes of particular buildings, with difference of materials, of mechanical skill, of climate, and of those peculiar qualities of mind in the builders which go to form what is called the genius of a people.

The first beginnings of architectural design were the fruits of a desire to hand down the memory of some great event or personage to future generations. The next were inspired by man's religious instincts, and it was only after architectural ideas had become somewhat crystallized by practice in these two directions that they began to be applied to buildings of a purely utilitarian character. It would take too long, and it is not necessary for the present purpose, to trace in detail the evolutionary process by which each style advanced to its highest perfection only to be gradually changed into something altogether different. But this point may be noted in passing, that the change from one style to another was always the result of the introduction of new factors such as a change in structural methods caused by the attempt to solve new problems or supply new needs, never from a mere desire to change the fashion of the external form in which architectural ideas were expressed. The most potent of these factors have been the general use of the arch by the Romans, the development of groined vaulting by the Gothic architects, and possibly the use of the truss. A couple roof and a simple barrel vault both require a straight wall for their support with only this difference, that unless the vault is tied in so as to take the lateral thrust off the walls, they must be made much thicker to resist that thrust than would be necessary to carry the couple roof. But as soon as the principle of groining or trussing comes into play, the continuous wall necessarily changes its character and becomes a series of strong supporting points with a comparatively light enclosing wall or screen between them. In the case of the highest development of this idea—the Gothic cathedral—the enclosure becomes a mere frame of stonework for the display of the largest possible quantity of painted glass. In effect the side wall is cut into sections which are turned round at right angles and so developed into buttress and flying buttress and pinnacle. This is but one illustration of the principle upon which all true development has taken place.

Two important elements in the formation or modification of style have invariably been materials and climate. The Egyptian and Grecian styles could never have been developed except in a country capable of supplying very large blocks of excellent stone. Nor could the type of dwelling house found in Pompeii, with its shady open air features, so suitable to the south of Italy, ever have come into general use in the climate of the northern parts of Europe.

The course of the historical development of style has been along certain well defined channels or main arteries. There have been many offshoots, and possibly some indigenous styles, but these may all be left out of account because they have had no influence upon the general historic sequence of styles. This sequence includes the Egyptian, the Assyrian, the Greek, the Roman, the Byzantine, and the Gothic. No style outside of these can be said to have had any influence in forming the great historic chain of styles.

One or other of two great principles of construction will be found to be the ruling idea in the formation of every style. And the distinction between these two is so great that it is a question whether it would not be proper to say that there are only two great styles, and that all others are only sub-divisions of them. The one of these great root principles is that of the pillar and beam, and the other that of the arch. All before the Roman period belong to the one style, and the Roman and all that come after it to the other. For although the principle of the arch was undoubtedly known long before the Roman period, it was the Romans who first used it as the leading principle of their construction.

Disregarding the intermediate links connecting the different styles, and considering only the most characteristic examples of each, their remarkable dissimilarity is much more obvious than their resemblance. It requires some consideration to realize for instance that the church of St. Sophia is the direct descendant of the Parthenon, the Pantheon at Rome of the Hippostyle hall at Karnak, and Salisbury cathedral of them all. But since it is so it is natural to expect that all these different styles should contain some elements in common. It might even be expected that the elements of which they are composed would be the same in all cases although used in entirely different ways, just as the type in a fount may set up at one time the text of Herbert Spencer's philosophy, and at another the wit and humor of Punch, or a work in the English language one day, and one in French or Italian the next. These elements are of two kinds, the constructive and the decorative. The essential constructive elements are very few in number. All that are absolutely necessary to constitute a building, are some sort of enclosure, a means of entrance, and in most cases a roof. The constructive elements then are walls, piers or columns, and a roof, composed either of lintels, vaulting, or trussed work; the choice between the three perpendicular or supporting elements being most frequently determined by the principle of construction of the roof to be carried by them. The decorative elements are more numerous and complex, although wonderfully simple after all. Mouldings are the most universally used of all decorative forms, and these, no matter where or in what style they may occur, consist invariably of one or more of four simple elements used either singly or in combination. These simple elements are the ovolu, the hollow, the bead or roll, and the fillet. The ogee is only a combination of the quarter round and the hollow, and the scotia is only two hollows of different sizes contrasted. The fillet may be used either with its face set perpendicularly or at an angle, in which latter position it suggests the chamfer which may therefore be reckoned as merely a modification of the fillet and not an independent element. There is absolutely no moulding or combination of mouldings in any style that has ever been invented that is not made out of these rudimentary elements. The possible number of combinations of these simple elements is practically inexhaustible, through the mere variation of the order of their juxtaposition and their relative sizes. When to this is added the variety obtained by modifications of their profiles the possibilities become infinite. Compare the crude simplicity of the Roman ogee or ovolu with the subtle refinement of the Greek, and the difference is at once apparent, and yet they are essentially the same. There is a great difference in the effect of the ordinary attic base and the common Early English one, which consists of a small roll at the top and a large one at the bottom with a hollow and fillet between, and yet the chief difference between them is the omission in the Gothic base of a couple of fillets. The Greeks sometimes combined their elements in such a way as to produce undercut mouldings, and the Gothic architects afterwards seized hold of this idea and used it with wonderful effect in composing their groups of mouldings. But an analysis of the most elaborate groups invariably shows that they

are composed of the same simple elements. The desire to produce richer effects than could be obtained by simple mouldings led to the enrichment of their surfaces and so to the use of decorative carving. Sculpture also appears from very early times to have been associated with architecture as a decorative accessory. And the character of the carving and the sculpture varied in different styles, and, taken in conjunction with the mouldings, contributed largely to their individuality.

All architecture then is composed of the same elements. But there is a radical difference between the principles on which these elements were used up to the 16th century, and those on which they have been used since. In the old method they were used as the words by which expression was given to those new thoughts which were ever contributing to the building up of the body of true architecture. In the modern method the thoughts themselves are appropriated and combined and arranged to make up the eclectic architecture of modern times.

That eclecticism is the ruling motive of modern architecture may be considered as an accepted fact. All the so-called "Revivals" have been nothing but eclecticism. The advance of science and the increased complexity of modern life have constantly raised new problems from the solution of which some tendency at least towards a new style might reasonably have been expected. Engineering and all the other sciences have kept fully abreast of these new demands, and have often created new wants by offering the means of satisfying them. Architecture alone has failed to rise to the occasion. It is not to be denied that in some respects architecture has advanced even within the last generation, but there has been no change of principle and the improvement has been rather in taste than method.

The chief factors in the creation of these modern opportunities have been the increase in knowledge of the properties and strength of materials and of the principles of framing; and the improvements in the manufacture of iron and steel and of glass. The building of the Crystal Palace by Sir Joseph Paxton, about the middle of this century, gave a great impetus to the use of iron, and the iron front became the new idea. Fortunately it had not vitality enough to live very long. Had the designers been able to divest their minds of the old ideas they might perhaps have made something of the new one. But instead of this they simply took the old forms of a stone construction and tried to adapt them to the new material. The result was inevitable. To save material, columns and other features were attenuated to the last degree, and to save expense in modelling, details were duplicated with hopeless monotony, while, worse than all perhaps, the principal idea to be kept in mind in designing or selecting the details was not "are they beautiful or appropriate?" but, "will they draw out of the mould?" Some of these attempts have been removed to make way for more modern structures, but many of them still remain and periodically challenge attention by blossoming out in a resplendent coat of new paint.

But the one great opportunity of modern times has been the advent of the steel framed structure generally spoken of as the "skyscraper." It is not yet many years since it appeared as practically a new problem; but the number of the attempts at its solution, and the vast amount of ability and skill that have been brought to bear upon these attempts, afford justification even now for an estimate of the value of the results. There is much variety among the examples and some of them are good, some bad, and some indifferent. But, however various they may be in other respects, this one thing has to be said of them all—that not one of them has contributed in the very smallest degree towards the creation of a new style. They are all shams in so far that their construction is not expressed but concealed. There is not an architectural idea in one of them that was not in current use long ago. They may be divided roughly into two classes, 1st, those in which the whole height is treated as one composition from which nothing can be taken away and to which nothing can be added without destroying its proportions, and 2nd, those which are designed on the principle of a pillar, some of the lower stories being grouped to form the base, and some of the upper ones the capital, while the intermediate stories form the shaft as it were. The first of these two ideas is by far the more difficult of successful accomplishment, and when it is successful the result is proportionately better than in the best of the other type. The second type is defective in that it fails to satisfy the eye that the design was made for just that number of stories and no other. The idea is suggested that the building might be cut in two in the middle, the upper part raised, and one or more new stories inserted. A design that conveys this impression to the mind cannot possibly have been made on true principles. The majority of the very tall buildings are also found wanting when the test of suitability of design is applied to them, because they are usually so situated that they cannot be seen except so much foreshortened that their proportions are entirely destroyed. The only appropriate place for a skyscraper is on the side of a large open square or at the end of a long street, which latter, of course, is rarely possible. It therefore carries within itself the seeds of its own destruction as an architectural idea, because its advantages depend upon its standing alone and towering over its less aspiring neighbours. A street of skyscrapers would defeat its own purposes, and a city of skyscrapers would be unfit to live in. Hence there are already signs that its day is over and that the height of street buildings will in future be generally restricted by legislative enactment. It is not wonderful that the skyscraper has done nothing towards the production of a new style nor that some of the examples have not been very happy as designs. The wonder is rather that, considering the time usually allowed for designing them, the average results have been even so good as they are. There is no need to regret that the skyscraper has done nothing towards the attainment of a new style because it could, after all, have been nothing more than a style for skyscrapers, while a new style to be of any use must be one capable of universal application.

One can hardly look back over the history of the styles without asking oneself the question—Is there any reason why they should not have been developed upon other lines than those which they actually followed? If, for instance, the Roman style developed under one set of conditions into Gothic and under another into Byzantine, why might it not under a third and easily conceivable set of conditions have developed into a third style differing from both of these as much as they do from each other? We have seen that all architecture is composed of the same essential elements. If these have been combined to form styles differing from each other as much as Egyptian and Roman or Greek and Gothic, why have they never been combined to make another different from them all? It can only be because the evolution of a style is a long slow process and the world was not big enough to allow of the complete separation necessary for the existence at the same time of more than one or two of the wholly different sets of conditions necessary for the evolution of distinct styles. And further because during all the time that the old styles were in process of evolution, certain social conditions favorable to the process prevailed but have ceased in modern times to exist, and have been succeeded by others distinctly unfavorable.

In view of the fact that so few distinct styles were evolved during the past, is it possible by analysis to arrive at such a knowledge of the principles out of which they grew as to afford a hope that even yet the following out of the same principles might result in the production of a new one? We have seen that the elements of all styles are the same and are always at hand. There are men of as much talent or even genius in the world to-day as there ever were. The sister arts of painting and sculpture are as much alive to-day as they have ever been at any period in their history. Why should architecture of all the fine arts alone be dead? Is no resource left her but that of fitting together the dry bones of the dead past instead of going forward in the full exuberance of life and creating new ideas to be handed down as working material to future generations as the ideas of the past have come down from one generation to another?

The eclectic method has been tried for several centuries and has failed. Is there no other? Would it be possible by going back to first principles to design a building absolutely without style? Much has been written and spoken about "catching the spirit" of a style but those who have succeeded best in the attempt have only succeeded in producing imitations—close enough in many cases to deceive those ignorant of the date of their erection into believing them genuine works of the style imitated. They have done absolutely nothing towards carrying the evolution of the style one iota further. There is, however, a "spirit" of design without which no good work ever has been done or ever will be done in any style. It is something akin to thinking without words. It is the creation of a design by the thoughtful working out of all the problems involved under the special conditions of the case. It is conceivable that up to a certain point a design might thus be worked out that would be structurally complete, perfect in its proportions, and yet without a trace of detail belonging to any known style—in fact without any detail at all. One could not look at the Parthenon or Salisbury Cathedral from a distance too great to permit of any detail being visible without in some measure being conscious of the difference in the spirit of the two styles. If it were possible to work out a design, even without detail, that would not suggest the spirit of any known style, the first step would be taken towards the invention of a new one.

Let us conceive the experiment tried under the most favorable conditions. Let the designer be a man who has been brought up like a Nazarite from his birth with a view solely to this experiment. Let us assume that he has been thoroughly trained in the theory and practise of construction so that the most intricate problems present no difficulties to him. But with all this knowledge of building he has never seen a book on architecture, nor a photograph of any architectural example; and he knows nothing of ornamented construction. Let us suppose further that he is naturally a man of artistic temperament to whom the beauties of nature are a constant delight, and that he is a lover of painting and sculpture. Now suppose a problem set before him to be worked out, without regard to cost or any other limitation. The subject selected would probably be a large church, because religion has caused the production of a greater number of architectural monuments than anything else in the world. Now how would he go about it? The first idea would be that a large number of people must be able easily and comfortably to see and hear the whole of the service. This means to begin with a large open space unencumbered with piers or columns—altogether there would be no objection to the use of these outside of this space to form aisles or other adjuncts. But they would not be absolutely necessary as constructive expedients because the use of trusses renders it easy to roof over without intermediate supports, any space that could possibly be required for an audience room. A consideration of the pros and cons in regard to the different available forms would probably lead to the conclusion that a rectangular plan not very far removed from a square would be, upon the whole, most convenient both for sight and hearing. Perhaps it might be more convenient to put staircases, vestries, schoolrooms and other appurtenances in projections rather than within the main walls. Something of the nature of an apse or chancel might be rendered necessary by the ritual. A tower might be necessary for bells. Some stacks might be required for smoke flues and ventilating shafts. Windows and doors would be necessary, and perhaps also porches. If the roof were of truss construction a greater thickness of wall would be necessary under the ends of the trusses than elsewhere, which would break up the uniformity of thickness of the walls. That appears to be all. Two other

factors, however, remain to be considered—materials and climate. In a country in which stone is the usual building material and in which large stones could be readily procured, lintels would probably be used to cover the openings, to save the labor of cutting voussoirs for arches. On the other hand if only small stones or brick were available the openings would naturally be arched over. Considerations of climate would probably determine the pitch of the roof and how the eaves should be formed, whether by projections or otherwise, also perhaps whether there should be an inside ceiling to form an air space or not. The dimensions of the windows and the character of the glass would be determined partly by the quality of the light and perhaps by the character of the service to be performed in the building. In a cold bright climate the windows might be smaller than in a warm foggy one. If the service were one in which books had to be used by the whole congregation more light would be needed than if the ritual were not committed to paper at all or if books were used only by the clergy conducting the service. It might even be desirable to have only a "dim religious light" in the portion of the building occupied by the audience in order that they might better see what was done by the officials conducting the service, on whom a bright light should therefore be thrown.

The raw materials out of which the design is to be made are now lying ready to the designer's hand, and it cannot be said that they are lacking in possibilities. The first thing to be done is to arrange the different features in the relation to each other that would be most convenient for the purposes of the building. This would soon be accomplished. Up to this point all has been plain sailing, and no difficulties have presented themselves to our designer, accomplished as he is in engineering and building, but ignorant of architecture. But now a new problem presents itself. Aesthetics must be taken into account. The building is not only to be strong and convenient, but it is also to be beautiful. The designer has now gone as far as his knowledge of building will carry him, but if he were to stop at that point the result would simply be building, and not architecture at all. How much further will his natural artistic instincts and cultivated taste carry him without any knowledge of existing architectural forms? Bringing these to bear upon the character of the materials to be used, he would probably see that polished variegated marbles would call for some treatment requiring large unbroken surfaces, while a material of uniform texture, especially if light in color, would require to be broken up to get the effect of light and shade. They might also enable him to compose his raw materials in masses, so as to produce agreeable effects of light and shade. But he must go much further than this, to produce anything worthy of being mentioned, in comparison with the masterpieces of ancient or modern architecture. There must be beauty of detail as well as of outline, and play of light and shade on surfaces as well as in contrasting masses. He would now have to go on to express the construction by suitable detail, and enrich it with appropriate ornament, so as to form a beautiful and harmonious whole. If, with the limitations we have assumed, he were able to accomplish this, he would thereby prove himself such a heaven-born genius as has never yet appeared in the world. All his ideas of outline of masses and play of light and shade and beauty of form would have been derived from a class of objects entirely different in shape, proportion, color and texture, from those with which he was now called upon to deal. He would be practically in the position of a student, say of electrical science, who had studied the theory of electricity but had never seen a dynamo or other electrical machine. Such a person would probably discover on taking his first model to the patent office that he had wasted his time in inventing again something that had been invented in the very infancy of the science. Our designer would be in the same position. So far as architecture is concerned, he would be in the position of a child or a savage, and his best efforts would inevitably be crude and puerile.

Now let us suppose the same problem presented to an architect trained in the modern or eclectic school, the sole proviso being that his design should be beautiful, but absolutely devoid of style. Would it be possible for him to divest his mind of all his accumulated knowledge of the architectural forms and details and ideas of the old styles, as a slate is cleaned off with a damp sponge? Is it not more likely that from the very first steps in the arrangement of his plan he would be influenced by recollections of the old styles? He could not divest himself of the influence on his taste of those buildings which he had admired and studied. Try as he might, he would find recollections of basilica, or temple, or cathedral, or mosque, suggesting ideas as to the treatment of his raw materials, and insensibly he would find himself designing in some familiar style. He could not help himself, because style consists not merely in ornamentation, but also in structural form and disposition of mass. So the questions of style and external treatment have to be kept in mind even in the arrangement of the ground plan. The consideration of the nature of the various materials alone would bring him face to face with the question of style. Is the ruling motive to be the beam or the arch? This might not be determined by local circumstances, and so the one system might be as available as the other. What is to determine it then? The aesthetic taste of the designer. And having once made his choice, his artistic instincts would lead him to adhere consistently to the principles of the system chosen. The leading lines must necessarily be either horizontal or vertical, because every great architectural monument that has ever been produced has been either in one style or the other.

No! it is not thus that a new style of architecture will ever be invented. Man is always the heir of all the ages, and his heritage is the sum of the learning and knowledge that have been slowly accumulated in the past. Progress is only made by advancing beyond the highest point previously reached. The men who originate new ideas are those who are most familiar with all the ideas of their predecessors. New inventions are most likely to be made by those who are most familiar with all previous inventions. So, in art as in science, that man is most likely to invent a new form whose mind is most saturated with the best of the old forms.

Some attempts have been made to produce a new style by harking back to some old style at an incomplete stage in its development, and trying to carry it onward on some other lines than those on which it was actually developed. This appears to have been Richardson's idea in attempting to revive the Romanesque style, and to that extent his attempt differed from most other modern attempts to revive old styles. None of these attempts have had any better result than to galvanize the old forms into a semblance of life more or less ephemeral according to the ability of the apostles of the cult for the time being. Examples of the more recent attempts will at once occur to you—the Gothic revival, Norman Shaw and the Queen Anne, Eastlake and his so-called principles of "Truth." It is curious to observe in Eastlake's case how some of the designs in his own book belie every one of the principles laid down in it. It is difficult, for instance, to conceive on what principle of truth a book-case can be designed which is finished on top with an imitation of a shingle roof with dormer windows. As regards Richardson, it is futile now to speculate what he might or might not have accomplished had he lived to the allotted span. His experience would doubtless have been that of all others who have trodden the same path. Measured by actual results, his influence upon the architecture of this country has not been beneficial, not so much because of what he did or failed to do, but because of what his imitators have done. Richardson went to original sources for his inspiration, but most of his imitators have only gone to Richardson, and the result therefore cannot be considered surprising.

Attempts have sometimes been made to combine the outlines of one style with the details of another, but no new style has ever resulted from these attempts. The best example of this is probably the French Renaissance of the time of Francis I, where the outline is Gothic and the details mostly Classic. The effect is picturesque, but there was no vitality in the resulting style or variety. The English Elizabethan is of the same type. The term "debased" applied to it by the Gothicists is not inappropriate, and no better instance of this debasement is to be found than in the west front of Westminster Abbey, where the classic details look strangely out of place on the Gothic front.

If, then, all attempts at revivals have failed to produce a new style; if the eclectic method has failed; if the invention of new constructive methods and the creation of new needs have also failed, and if the attempt to dispense with style altogether is sure to fail, is there anything left on which to base a hope that there will ever be a new style? It is a question not lightly to be answered. The conditions under which the old styles were produced have long passed away. Life was leisurely in those old days. There was time to linger over a design until it was as perfect as its author could make it. Men whose work was of an artistic kind worked for the love of their art, and took pleasure in their work for its own sake. The styles were not made by men who looked upon their art as a mere means of making a living. In those days each worked in only one style, and all worked in the same style at the same time, and they probably knew little or nothing of any other, so that to them it was the vernacular. They did not dabble in Greek one day and Gothic the next. In some cases they may have had before them examples of the preceding styles out of which their own had grown, but they could only have had such knowledge of these as they could obtain at first hand. There were no excursion trains to afford them the mental dissipation of a glance at all the monuments of antiquity during a summer holiday. They had few books, still fewer illustrations, and no photographs at all. So it is not surprising that some of the Romanesque work, for instance, was obviously the result of efforts at recollection of Roman forms, which might perhaps have been copied literally, had the means only been available in the shape of a library. Men were therefore compelled to think for themselves instead of borrowing the thoughts of others. The growth of a new style was an affair of centuries. The best Egyptian or Greek architect, if called upon to design a spire, would probably have pronounced it impossible. And so it was, within the time at the disposal of one man or one generation. But keep the problem before one generation after another, and gradually the thing is done—not all at once or by one man, but slowly, through many tentative efforts and failures, success is finally reached, and the Greek temple becomes the Gothic cathedral. Mr. Sturges puts this idea very well when he says: "Once only in a series of centuries appears an architectural thought destined to grow great and stimulate other thoughts, and call out their embodiment in visible form."

The shadow cannot move backwards on the dial, and the old conditions can never be restored. Some one said recently that "the most fertile mind—much less the average—is not able to produce from the use of the material and purposes of the structure, an entirely original supply of forms, especially within the limit of the time allowed for the occasion." That is true, and therefore every architect must express his ideas in the forms of some known style. All styles are open to the choice and all are alike alive or alike dead to this generation. The history of the last three centuries seems to point to the Renaissance as the one most in touch with the spirit of modern life. It is by far the most plastic of all styles. It is suitable alike for all classes of buildings, from the most humble to the most palatial, and for every purpose—domestic, ecclesiastical, educational, commercial, municipal, national and monumental. So long as the fancy is restrained within the limits of good taste, its forms can be used with the utmost freedom, and adapted to every purpose. Every young architect, after having acquired a general knowledge of all styles, should take some one and make it his own and try to know it thoroughly, in its principles, its history, its monuments and its details, and he should design in that and no other. If the Renaissance is chosen, then some one phase of it—say French or English—should be thoroughly mastered before another is taken up.

It cannot be predicated with certainty that there will ever again be a new style. But there are certain principles on which the existing styles should be used, and it may be confidently asserted that if these principles are not followed there will assuredly never be a new style. Blind copying will never produce one. It would be a long task fully to analyse and formulate these principles, but for the present purpose they may be summed up into two propositions: 1st. That construction must be absolutely truthful, and must be expressed in forms appropriate to the purposes of the building; and 2nd. That no moulding or feature of any sort must ever be used merely from habit, or without careful analysis to discover why it is pleasing to the eye, and what it means, and even then it should be used only after long and careful consideration whether it should be used at all, what function it is to perform, and whether nothing better can be devised to perform that function.

The following out of these principles may never result in the formation of a new style. Certainly no one man will ever invent one; but it may be that the efforts of some of those who try faithfully to carry out these principles may start an influence that will increase as it rolls onward, until in course of time it will be found that unconsciously a new style has grown up. But assuredly the only efforts that will be of any avail will be inspired by an earnest striving after what is true and beautiful, and an honest love for art for its own sake, and only when these are vivified by at least some spark of that divine creative imagination which must be born in a man, and without which he may be a builder, but never an architect.

Mr. Henry said he had been wondering how an architect who confined himself to one style, and practised in that style only, was to live. Of course he could no doubt spend with advantage far more time than most of them did in studying one style; still, necessity would compel him to branch out from it occasionally.

Mr. Gibson said that all the examples of distinct style had been exhibited in public buildings; but was not there a style developing in regard to private buildings, particularly in respect to those of the better class and of later dates?

Mr. Darling, in moving a vote of thanks to Mr. Dick for his paper, said that he thought that gentlemen had fully exhausted the subject. Speaking of a person following one style and still making a living, he (Mr. Darling) thought one of the best examples of that was Norman Shaw. The spirit of his work is Gothic, but he impresses upon it his own individuality. In following the old styles and old theories, he had not simply adapted the details from old work, but he had analysed and found the principles underlying them, and then had done work himself that was as nearly original as it possibly could be. The trouble with most men in a country like this was that they had to adapt from old works certain features and embody them in new buildings. The Americans, to his mind, copied things straight. They had got a tremendous number of photographs, and they simply reproduced from them. He had noticed in the States a mantle-piece by Mr. Richardson which had been simply copied and put into a private house. It seemed to him that that was a mistake. The architects might have taken the general principles underlying the design of that mantle-piece and then adapted it. Norman Shaw had done this as far as the origin of his work was concerned, but by the time he had finished with the details the work was his own. If the younger men in the profession would devote themselves more to analysis the result of their work would be very much more satisfactory than if they simply copied; and that there was a strong tendency to copying all over this continent was very manifest. He had great pleasure in proposing a vote of thanks to Mr. Dick for his able paper.

The motion was seconded by Mr. Belcher.

Mr. Paull observed that Mr. Dick, in tracing up the history of architecture, had shown that the art was governed in early times to a very large extent by the amount of stone that was within reach; and subsequently alterations had resulted from other conditions of a similar kind. Mr. Dick had said that there did not seem to be any chance at all of another order of architecture springing up. He thought, however, a new order might arise, if one looked forward far enough—say a hundred years. That would be too late for this generation. Take the history of the lighthouses built within the generation. Take the Bishop's lighthouse at the Scilly Isles. Some years ago one was built there of iron, and it blew down a few years afterwards. Then a lighthouse was built there with a base of forty feet, built up almost solid, and carried about one hundred and twenty feet high. After a few years storms came and shook the lighthouse to its foundations, and blew off a portion of the lantern. Then engineers were called in again, and they found it was necessary to put a casing of stone on the outside of the lighthouse seven feet wide at the bottom and two feet wide at the top; and now, he supposed, it is so strong that if an earthquake was to take place that lighthouse would not likely be shaken down. So that we see that these things are experimental, and done by progressive steps by superior men, and Mr. Dick's new style may arrive by and bye.

Mr. Gibson said that he thought an element in a new style would be the use of iron as a tie-rod, which had only been employed in the old styles incidentally. He could explain perhaps by reference to a cart-wheel. In the old style of wheel the spokes formed struts or braces; in the new style they formed a tie—quite an opposite force.

The President: I have heard the bicycle was revolutionizing things; I did not know it was going to revolutionize architecture.

Mr. Gibson said that if the principle was good in the bicycle—which it was—there was no reason why it should not be good in architecture.

Mr. Simpson asked what would constitute a new style. It had often struck him that the architectural work in Chicago, for instance, was characteristic. He supposed many of those present were familiar with the work of Adler & Sullivan. He had not himself seen any other examples of the style they had brought out.

A member: It seems to be an adaptation of the Moorish. It is very largely decorative.

Mr. Gregg remarked that the definition in the paper pretty well answered the question whether a new style was possible. If the style must show the period and the character of the locality he did not think a new style was possible, because such conditions as those under which the old styles arose could never occur again. The large number of examples we have before us, and the facilities for travelling that now exist, make a very different set of conditions from those under which mediaeval builders worked.

Mr. Gibson: Why is a new style desirable?

Mr. Darling: There is no outcry for a new style.

The President observed that he felt sure they had all been very much pleased by Mr. Dick's paper; and perhaps some thoughts that had been vaguely floating through their minds had been concentrated, and some thoughts added to them, by the paper.

The motion was then put and carried.

Mr. Dick thanked the Convention for their patient attention to rather a long paper. The subject, he had found after he had begun to get fairly into it, was really too big to be handled in a paper. It was a subject that would require a book, and a great deal of the matter of which he had notes which he had intended to use—which would have softened down, perhaps, by a further explanation, some of the points which seemed to have been rather crudely and baldly stated—he had found it necessary to drop out altogether simply for want of space. If he had attempted to go into all of the points which the subject had presented, he would have occupied their time for the whole of the afternoon and exhausted their patience as well. In reply to Mr. Henry's question as to how a young architect could make a living if he practised only in one style, Mr. Dick said that it was not always possible to pursue the course that was theoretically the best, and pointed out that most great architects had worked only in one style.

Mr. Paull rose to say that they had had a very valuable lecture or address on the previous day from the President. There had been very many valuable points in it which had been presented with a sequence that he thought they all admired. There had been no vote of thanks to their respected presiding officer proposed at the time, and he did not think it was out of order to propose one now. He therefore moved now a vote of thanks to Mr. Gordon for his very valuable address.

The Convention signified their approval of the motion by applauding heartily.

The President replied that he thanked them for the motion adopted in this informal way. The form in which he should like to receive their thanks would be their thoughtful consideration of the two suggestions he had made in his address. One was the question as to the adoption of some degree or some form of distinction in their membership. It seemed to him that even with their amendments passed—even supposing they were placed in the position of being to a limited extent a close corporation—that would involve the bringing in of all who are in any way seeking a living by architecture. It would mean that every country builder who sought to call himself an architect would have to become a member of this Association, and for long years to come the public would not be able to distinguish that there was any particular advantage to a man in being a member of the Ontario Association of Architects; but it seemed to him that with their amendments carried or without them it would be desirable that men who have passed an examination and who have therefore shown themselves qualified along the purely technical lines, should be placed in some way in a better position than any one who might come in by virtue of legislation. He thought that those who had passed an examination should be singled out by some title or designation from those who had made no effort to so qualify themselves. Then he thought it would be very invidious to place a young man who had passed in this way on a higher plane than those who had practised their professions for ten or fifteen years, and who had put up buildings which were sufficient evidence of their skill and ability as architects. He would say that all men who had been practising architecture for ten years—or, if they liked, make it shorter—a sufficient number of years to show they were architects—that they should be eligible for the position of Fellow. Thus they would have the grade of those who were graduates and the grade of those who by their work had proved they were competent architects, and thus they would have a distinction at the first and all through until their Act would have had the effect of grading up the whole of the profession to a proper standard. The other point was one which he felt very strongly on himself. That is, the question of expert evidence—the question of having to go to court, as some of them had occasionally to do, and give expert evidence, and then having their statements in evidence largely discounted, and themselves placed in the humiliating position of practically being told that their evidence did not amount to anything. They ought certainly to seek means of having this altered so that in such cases they should be called in by the court and not by the litigants. He thought they should, to begin with, have a standing committee of this Association to investigate the question, and in doing so to get all the information that could be got from France or elsewhere, and to associate possibly with the committee of any other body which might be interested in the matter in the same way, so that something might be done to remove this growing evil—an evil which involved a reflection upon the individual practitioner and upon the profession generally.

Mr. Gregg, speaking in regard to the first proposal of the President, said that last year there was a resolution upon this very point. That was, they passed a motion that every graduate having passed the examination should have a diploma. That idea should not be dropped. The motion had been passed and the diploma should be prepared, so that the graduate could have it and hang it up in his office. He would ask that the Council take the matter in hand and have a lithographed diploma prepared, even though it might be one that would not be an artistic adornment to the office. If it was only in Roman type and signed by the proper parties it would answer the purpose.

Mr. Darling said that he quite agreed with Mr. Gregg's suggestion about the diploma. But he did not think that the question of Fellowship should come up Who was going to judge among all the members of this Association who were really architects and who were not? He assumed that every man who would come into this Association would have to be a Fellow at the start, the difference remaining to be made afterwards. They could not suppose that all the men over the country were going to stand it if ten or twenty of those constituting this organization were to be permitted to say who were and who were not architects. If the Association ever got its Act they might take some steps in the way of grading examinations in the years to come as the older men dropped out.

Mr. Simpson thought it would be rather premature to consider anything of the sort at present.

Mr. Baker thought the proposition only amounted to adding a name to what was already in existence. He thought the thanks of the young men in the Association were due to the old men and them alone for the position of the Association to-day. The thing would be in a very bad shape if left to the young ones, judging from the amount of interest they had shown in it. He did not see why they should not call every member who had been practising ten years a Fellow, and the others Associates, and also those who pass in future, Associates.

Mr. Darling: Supposing you call all the men who have been practising ten years Fellows; would a man who had only been practising nine years be kept out, and then would you a year afterwards call him a Fellow?

Mr. Baker: Certainly.

Mr. Darling: I do not see the reason of it.

Mr. Baker: I think every other association of the kind in existence has something of that sort to distinguish the members.

The President remarked that he was glad that the initial stage of the discussion had been got through with. The matter might now simmer in their minds, and perhaps by the end of another year they would be in a position to discuss it a little further on its merits.

Mr. Burke moved that the Council consider this matter and report upon it a year from now, as also upon the suggestion with regard to experts.

Mr. Power seconded the motion.

Mr. Burke expressed the opinion that the matter with regard to experts was very important. He thought it was very humiliating to go into court and see two architects of reputation giving evidence, each swearing diametrically the opposite to the other, each evidently inspired by the side by which he was employed.

Mr. Curry did not see how they were going to stop that. It was the same thing with the medical profession, and the medical profession as a body were very much better educated. As long as they had a body of men unequally educated they were going to have that difference of opinion. How often did a lawyer come to them to give evidence if he found that they would give it as the facts were and not as he wanted them to be represented? Lawyers went and hunted for evidence that was favorable to their own side only.

Mr. Burke said that the French idea was to have a board of experts who would report on the thing alone.

The President had known of cases in which the court had taken upon itself to appoint an official expert. It was done sometimes, he believed, in connection with the medical profession. He had known also of one or two isolated instances where in building cases the judge had appointed an expert. That principle they would like to see carried out in its entirety—and that was the object of his suggestion—instead of its being an optional and very infrequent thing.

Mr. Darling thought they were laying down to themselves a very big job. He did not think any small body of men like themselves could induce any government to pass such a provision. He thought the simplest way out of the difficulty would be for the whole profession in Toronto to refuse to give evidence.

A member: You cannot refuse to give evidence.

Mr. Darling replied that he had refused. He had stated, "I will not give my opinion until I go into court. I will then give my opinion whether it is in your favor or the contrary." They had then declined to subpoena him. If one said that to the lawyer who wanted him to go into court to give evidence the lawyer would not then subpoena him. He had heard a statement made by a lawyer a short time ago which had irritated him beyond endurance. That was a case in which, half a dozen architects having given evidence, the judge (the lawyer had told him) had said afterwards he did not believe any of them.

Mr. Curry and Mr. Darling objected to the two matters being dealt with in the one resolution.

The motion was then put that the question with regard to expert evidence be referred to the Council to bring in a report thereon at the next annual meeting, and on a show of hands it was declared lost.

The motion that the question with regard to degrees be referred to the incoming Council for them to consider and report upon at the next convention was then put, and was declared carried.

The President said that the next matter was the continuation of the discussion, adjourned from the previous day, on the question of chapters.

Mr. Dick, for the benefit of those who were not present on the previous day, gave a very full synopsis of the contents of the reports which he had submitted upon the subject, and then went on to say that, speaking as a member of the Association living in Toronto, he would like to say that they found such a chapter was really necessary. He remembered three cases in the past that showed it. One was that of the public competition for the city building. They had seen that certain conditions governing the competition ought, as they thought, to be improved; and in an informal way an influential architect called a number of the profession together, and a meeting was held. If there had been a chapter the secretary of it would have called the members together in a simpler manner. In another case a law suit was being carried on, and a certain firm called a meeting of the city architects and asked them to join with that firm in fighting out a certain point that was of interest to every one of them. Still another case was one which came up every year. The City Council had said that the Toronto architects were to appoint two members on the Board of Management of the Technical School. There was no proper body to elect these two members as things were at present. If they had this chapter in Toronto the City Clerk would communicate with the secretary, and the chapter would then elect these persons. He knew of a similar case in regard to a competition in Ottawa; and there were other instances which showed the necessity of having an organization of the kind, even though its meetings might be infrequent.

Mr. Darling thought they ought to have a body of local men who could be dealt with as an authority. One matter which they could have to do with would be building by-laws. He did not see that such an organization would militate against the interests of the Association. He thought if they could get men interested in a chapter they would take much more interest in the Association; and if other places would get up chapters it would, he thought, be a help to the Association also.

Mr. Belcher said that there could not possibly be a chapter where he resided, and therefore he could speak of the matter without being suspected of having any axe to grind. He quite agreed that it would be a good thing to establish a chapter here, and possibly others in Hamilton, Ottawa, London and Kingston. Members of these could get together and discuss various matters, and benefits would result not only to the chapters and to their members individually, but, he was sure, to the Association also. Then, when those belonging to the chapters got others who did not, to meet them here, they could post the latter, and from time to time, as opportunity offered, other chapters could be formed in the smaller towns.

The motion for the adoption of the report was then put and carried unanimously.

Mr. Curry intimated that he had a resolution in a rough form which he wished to submit to the meeting. It might afterwards, he said, be put in better shape.

Resolved, That the Council of the Ontario Association of Architects are hereby urged to procure, if possible, from the Ontario Legislature, the amendments to the Ontario Architects' Act which would enable the Association to carry on the provisions and objects of the Act.

That it is the opinion of this Convention that the Act has failed to accomplish the purpose stated in its preamble, which reads, "Whereas it is deemed expedient for the better protection of the public interests in the erection of public and private buildings in the province of Ontario, and in order to enable persons requiring professional aid in architecture to distinguish between qualified and unqualified architects, and to ensure a standard of efficiency in the persons practising the profession of architecture in the province; and for the furtherance and advancement of the art of Architecture." It has failed to protect the public, because when they desire the services of an architect it makes no difference, so far as they can see, whether he is registered or not, and therefore, the most incompetent person being at liberty to call himself an architect, is just as capable in the eyes of the public as the registered man.

It has failed to ensure a standard of efficiency because, for the reasons above stated, the students plainly see that, as far as the public are concerned, those who qualify themselves to pass the examinations are in precisely the same position as the most ignorant persons. Therefore, only those students study who would qualify themselves, act or no act.

If the Act has failed to ensure a standard of efficiency, it is obvinus that it has also failed to further and advance the art of Architecture.

The architects of this province loyally undertook to carry out the Act even although they were fully aware of its defects; and they have borne the expense of doing so. In many ways the work has been a success, proving of great benefit to those who have taken the prescribed course of study and passed the examinations. But as the work is not in any way compulsory, many young men do not take the course or present themselves for examination.

The membership in the Association has fallen off to such an extent that it will soon be impossible for it to carry on the work any longer. There has been a yearly deficit for the past 4 years, amounting in all to $915, or an annual average deficit of $229. It seems, therefore, as if the wisest course for the Association to pursue would be to cease their efforts to have the Act amended, thus throwing upon the Government the responsibility for taking such steps as are necessary to protect the public interests.

The amendments to the Act which we seek are not of a character which would benefit any member of the profession financially. They would, however, raise the standing of the profession as a whole in so much as the architects of the future would be very much better fitted for their work, in that they would have received a thorough and systematic training preparatory to passing the examination. But our efforts have been misunderstood. We have acted in a disinterested manner, and for our thanks we have been accused of trying to benefit ourselves at the expense of the public. If the public desires to live under the present condition of affairs, there is no reason why we should not permit them to do so in peace.

It would be most unfortunate if the result of the work which has been accomplished in establishing the system of examinations should all be thrown away because of the inability of the Association to continue longer to carry it on. This Association would therefore respectfully urge upon the Government the necessity for their taking up and carrying on the examinations.

He thought it was hardly necessary for him to add anything to what he had said on the previous day. They did not want to be going year after year to the Legislature asking them to amend this Act into a workable form, and to be practically told that they were doing it for their own advantage, when in reality they were doing nothing of the kind. What they were doing was for the benefit of the public—to protect the public against dangers of which they seemed to be unaware, and which, if they were not desirous of being protected against, he would allow them to remain subject to.

Mr. Darling said that he had much pleasure in seconding that motion. As long as the principle laid down in it was maintained, it might be a little more carefully drawn, perhaps. It was certainly a very important one. He agreed with Mr. Curry that it was perfectly useless to go on year after year as they had been doing, and being met with the crassest kind of ignorance in regard to the matter on the part of people, who, besides simply knowing nothing about it, did not seem to care to know anything. They saw the same men year after year. They said, "Oh, yes, it is a very good thing," but that is the end of it. There was no use in going on like this indefinitely, because they could not help feeling they were just boring these people to death when they went to see them. The Minister of Education had always said that he was very favorable to this thing, that it would be very helpful, and that their support and interest in the School of Practical Science was going to help very much in the success of it. Well, if the Minister thought so he ought to do something. They had done their best to help the school along in common with the profession at large. Personally, it did not make the slightest pecuniary difference to any one of the men now practicing whether that amendment was passed or not. But it was going to make a very great difference to the country, and if the Minister could not see that he had better be told at once, in plain English, that if he was not going to help in the matter the Association was not going to help him. He could do what they asked if he liked.

Mr. Belcher thought it would be best to leave the matter in the hands of the Council, with authority to use the resolution at their discretion at any time that they might think opportune.

Mr. Darling thought the time should not be limited by the resolution to one year, but that it should simply express the idea that the Association were not going to continue after this fashion.

Mr. Curry said that he was willing to have the motion changed to any form as long as the principle of it was adopted. The Association were going on with a yearly deficit, and they could not continue that forever. They had tried year after year to have this Act amended, and they seemed to be no nearer that point than they were five or six years ago. If they could not have the Act amended they should know it at once, and then simply put their Association into a position in which they could maintain it without charging unnecessary fees.

Mr. Dick thought that they had continued their course of procedure long enough, going to the Legislature for something that was certainly not for their personal advantage. It seemed impossible to get it into the heads of politicians that any body of men could take the amount of trouble and go to the amount of

personal expense that members of this Association had done for some object, the attainment of which was not going to benefit themselves. That is the feeling that they have, and they have very little hesitation about expressing it. They say, "It is all very well for you fellows to tell us your object is educational—that you want to educate young men so that they will be your rivals in the future, but that is a little more than you can ask us to believe." He rose really to make a suggestion to Mr. Curry, and that was that he might embody in that resolution a suggestion that the Government, if they were sincere in their expressed approval of the aims of this Association, might show it in a very practical way by taking the examinations off their hands. He (Mr. Dick) did not see any reason, since the Government had established a faculty of architecture, they might say, in the institution in which they were then meeting, why they should not themselves take charge of these examinations and relieve the Association of the trouble and expense connected with them. The Government could certainly do that work better than this Association could. The Government had every facility; they had means and men and everything else that was required; and if they were, as he said, sincere in expressing their approval of the work of the Association, they could show it in that way.

Mr. Burke agreed with Mr. Dick. He (Mr. Burke) should be very sorry to see the Association drop the examinations. Speaking from his own standpoint, the result to his students from the holding of the examinations had been very beneficial; students have become a different class; and he thought it would be a calamity to the students in the offices of members of the Association generally not to have the examinations before them during their studentship.

Mr. Curry said that if this resolution met the approval of the convention he should like to have it understood that it be redrafted by Mr. Dick, Mr. Darling and himself, so that in doing so all points might be carefully considered and the motion very carefully worded; and he did not think they could possibly do that inside of a week or two, because they might draft it, and then after thinking it over come back to it again. What they wanted now was the expression of the opinion of the members on the matter.

Mr. Power said he liked what was contained in Mr. Curry's resolution. When it was read it was going through his mind that there might be something done on the lines that Mr. Dick had suggested. He thought that gentleman's idea ought to be embodied in the resolution. He thought it should just simply be put to the Government in this shape: "Either pass this Bill or not. Allow us to carry on the Association or relieve us of the expense." He thought that if the matter was put in that shape it would show that the Association were willing to settle the thing either one way or the other. They could not go on with the thing in the shape in which it is now. He, for one, was quite willing that the Government should take the examinations off their hands.

Mr. Simpson remarked that the Minister of Education should have been made an honorary member of this Association, so that he could have been present at their discussions.

Mr. Darling: I think he should have been, but I do not think he would have come.

Mr. Aylsworth remarked that there did not seem to be any objection to the proposition. He would move that if the resolution was not to be passed by the Association as it stood, they should approve of the principle of it and leave it in the hands of the Council as an expression of opinion.

The President: Any seconder for that—that we approve of the principle without committing ourselves to the details?

Mr. Belcher: I second that.

Mr. Gregg said that last year the examining board of members had to meet, prepare papers, read them over to each other, and then go over them after they had been written and either pluck or pass the candidate. The largest number of papers was for one candidate. The reason for the paucity of students is that students would not study unless there was something definite in the future that they were working for. As it is now they think they are working for nothing, and therefore they do not read the proper text books, they do not prepare themselves, and they are not ready for the examinations. As a member of the Examining Board he was strongly in favor of Mr. Curry's motion, and he would like to make the examination a strong point in it.

Mr. Darling suggested that if the convention had sufficient confidence in the committee of three which had been named to draw that resolution up, to put it in such form as they thought best, subject to the approval of the Council, it would be better for them to allow the resolution to pass as a vote of the convention. It would in that way be much stronger than if the matter were disposed of in the manner in which the motion just made proposed.

Mr. Aylsworth said that his impression was that it was not desirable that this should now be passed by the Association. He had merely made the motion to save time.

The mover and seconder agreed to withdraw the amendment and the original motion was then put, it being understood at the same time that the wording might be modified by the committee, especially that portion of it with regard to the limitation of the time to one year, and also Mr. Dick's suggestion as to the examinations should be embodied in it; and further, that the Council should make use of the resolution in any manner that they saw fit.

Mr. Strickland: Do I understand that this motion of Mr. Curry's will be perfected before it goes to Council?

Mr. Curry: Yes.

Mr. Strickland: Are they to change any of it or not?

Mr. Darling: No, not in principle.

Mr. Henry: It seems to me that Mr. Curry's motion, as modified, means either that the Association go on or that it be killed completely. It was almost too important a matter to be voted on suddenly.

Mr. Gregg: The Council are to use it as they see fit.

Mr. Curry said that they could not pass a resolution at the present time which was going to hold the hands of the convention a year from now. This motion did not kill the Association at the present moment. It must go on for another year. But they were about tired of dogging after the Government. He certainly did not propose to do it any longer. They saw it stated in the papers by people who do not understand what the Association were trying to do that the architects were looking out for themselves. He thought that if the public did not think that they were acting in good faith in the interests of the public it was time they withdrew.

Mr. Baker said that it was pretty hard for the younger members of the convention to find all that they had been looking forward to now about to go. As Mr. Dick had said in his paper on "Style" that the development of any one style was not a matter of one year but the work of time and effort, so it was with matters of this sort. As a younger member, one who has been a student, it struck him as being too bad altogether that the thing should be in the shape in which it now was. They had certainly to do something to make it workable; but he was entirely opposed to doing anything like discontinuing its work under the Act.

Mr. Darling did not think the resolution meant that they were going to give up the Association because they did not get what they wished. It was not burning their boats behind them; it was only getting the matter in some kind of form. What this resolution meant was that the men in the Council and outside the Council who had been doing this legislative work should be freed from the necessity of going up to the House and pushing the matter of legislation for an indefinite period. The Government were to be asked to assume the expense and responsibility of running the examinations. Surely the Government must be concerned in the success of the school they had started themselves without any suggestion from the architects of this province. The architects throughout the province had been taking a great deal of interest in that school and were prepared to take a great deal more interest; surely the Minister must see that.

Mr. Baker: Mr. Dick's point is a very good one; but outside of that I do not see what will be gained. When you started out ten years ago to get this legislation, you did not expect to get it in five years or ten years or twenty years, did you?

Mr. Darling: Certainly I did, and if you had heard what the Minister of Education has said to us, from time to time, you would have thought so too.

Mr. Gray said it seemed to him that the resolution was very comprehensive, and he did not see anything in the passing of it that would determine the future action of the Association. It seemed to him that it was only a matter of time in any case when these examinations must be dropped by reason of the expense. He thought Mr. Curry's idea was to take time by the forelock and to have this resolution as a means of freeing the hands of the Council. If the resolution resulted in attaining their object they would have taken a step in advance. If it did not they would be in a position in which they might either change their tactics or proceed upon some other line.

Mr. Henry: I would move in amendment that instead of the convention passing this as a resolution it be simply passed as an expression of opinion.

The President: I do not see the difference.

Mr. Henry said that it seemed to him that if they passed it as a resolution the Council ought to carry it out to the letter, and not do otherwise unless asked to use their own discretion.

Mr. Aylsworth said he did not understand the resolution in that way. He thought it was simply intended as a means of strengthening the hands of the Council.

Mr. Curry: With the consent of the seconder of the resolution I am quite willing to have it placed in the form Mr. Henry wishes to have it in—as an expression of the opinion of the Convention.

Mr. Darling concurred.

The President put the resolution in the form thus suggested and it was then carried.

Mr. Langton said that Mr. Andrew Bell, who had attended the convention, but who had had to leave to catch a train, had asked him to move to change the place of meeting of the convention next year to Ottawa. Mr. Bell had thought it would be a good thing for architects in his part of the country if the convention could be held in that city next year. He (Mr. Langton) moved accordingly that it be an instruction to the Council to call the meeting at Ottawa next year. The resolution not obtaining a seconder, it fell to the ground.

The election for four members of the Council then took place, and the gentlemen who were called upon to occupy those positions were: Messrs. Andrew Bell, S. G. Curry, D. B. Dick, and Frank Darling.

It was moved by Mr. Darling and seconded by Mr. Henry, that the same gentlemen be auditors for the ensuing year as had acted in that capacity last year, namely, Messrs. Henry Langley and W. R. Gregg.—Carried.

Mr. Henry moved a vote of thanks to the Minister of Education for the use of the building, and to the members of the Staff of the School of Practical Science for their courteous assistance, which was carried.

Mr. Dick asked leave to tender his resignation as a member of the Council, and said that he would have liked to have Mr. Watts, of Ottawa, elected to that position. Mr. Curry asked leave to resign and suggested that another member not residing in Toronto should be elected in his place. Both these propositions were received with expressions of dissent.

The following are the officers of the Association for 1897: President, Jos. W. Power, Kingston; 1st Vice President, E. J. Lennox, Toronto; 2nd Vice-President, S. G. Curry, Toronto; Treasurer, E. Burke, Toronto. Council—Andrew Bell, Almonte; Frank Darling, Toronto; D. B. Dick, Toronto; J. M. Moore, London; W. R. Strickland, Toronto. Registrar and Librarian, W. A. Langton, Canada Life Building, Toronto.

THE BUILDER

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PROMINENT CONTRACTORS OF MONTREAL.

WE have the pleasure of being able to present to the readers of this New Year Number, portraits of some of the leading contractors in various lines in the city of Montreal. In the accompanying brief biographical sketches are presented in outline the career of these gentlemen:—

MR. HENRY W. GARTH,

senior partner in the firm of H. W. & J. H. Garth, proprietors of the Dominion Metal Works, is a native Canadian, having been born in Montreal in the year 1840.

He was educated at Upper Canada College, Toronto, Ont., and after leaving that institution in 1863, entered the employ of Messrs Carpenter & Co., wholesale hardware merchants of Toronto. He remained in the employ of this firm for five years, and at the expiration of that time returned to Montreal. He then entered the employ of his brother, Mr. Charles Garth, who was then principal owner and director of the Dominion Metal Works. He became a partner in the firm in the year 1875, under the style of Charles Garth & Co. Mr. Charles Garth retired from business in the year 1878, when the subject of this sketch became senior partner, and associated himself in business with his nephew, Mr. John Garth. These gentlemen have since carried on the affairs of the firm most successfully.

The Dominion Metal Works was established in the year 1823 by the father and grandfather of the present

MR. HENRY W. GARTH.

proprietors. It is the oldest establishment of its kind in Canada, and to the enterprise of its originators is due the first introduction of gas lighting, the first hot water heating, and the first steam heating apparatus into Canada. Most—in fact, nearly all the principal public buildings, and many of the largest private houses of this country have been fitted up by this firm, and their work has given general satisfaction.

MR. GEORGE ROBERTS

was born at Camden Town, London, England, May, 1826. He learned his trade with his father, a contractor and builder, in conjunction with whom he erected several large buildings. He came to Canada in 1854, and was engaged as superintendent of buildings on the Quebec and Richmond Railroad, under the late Mr. R. J. Reekie. On completion of the works in 1856 he re-

MR. GEORGE ROBERTS.

moved to Montreal, and in the spring of 1857 commenced business there on his own account. In a few years he had succeeded in establishing a large business, employing on an average 75 to 100 carpenters and joiners. Mr. Roberts has been connected with the construction of many of the most important private and public buildings in the city, including the McGill Library and Physics buildings and Bank of Montreal. Mr. Roberts' workshops are equipped with the most modern facilities for the production of first-class joinery.

MR. GEO. W. REED.

One of the pioneers in modern methods of roofing is Mr. George W. Reed, of Montreal. Born in New England some sixty-eight years ago, and passing through Montreal just after the great fire of 1852, he saw the opportunity there was for a live man in the business, and promptly acted upon his convictions.

At that time slate as a roofing material had never been known in the city, and Mr. Reed was the first to introduce it to the attention of architects and proprietors. This habit of being first to take hold of anything good in his line of business has been a characteristic of his through all his long and successful business life.

His idea from the first has been that good work was the only sure road to success, and the results have justified his course.

As the growth of his business has demanded, new lines have been added to the old, until at the present time this is one of the largest houses in roofing and kindred trades in the Dominion, giving employment to a

large staff of men, and calling for clear-headed superintendence.

The latest addition is the agency of the Boston Blower Co.'s Canadian business in heating of large buildings

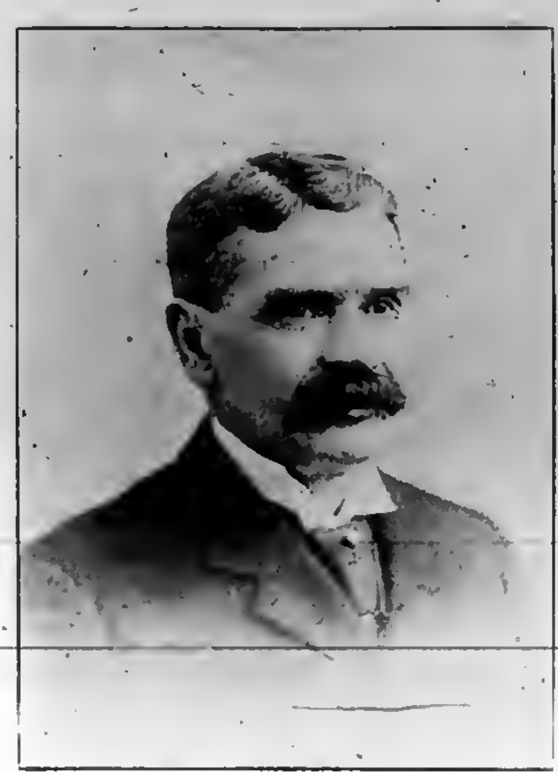
MR. GEO. W. REED.

and the fitting up of stock conveyors for cotton, wool, and other mills.

Among the business men of Montreal Mr. Reed stands in the front rank of those whose business lives have done much to elevate the standard of business integrity in the community.

MR. JOHN McLEAN

commenced business in Montreal as an ornamental plasterer in the year 1870, and for the last quarter of a century has been closely identified with this and other branches of ornamental work in connection with most of the important buildings erected in that city during that period. Mr. McLean has established an excellent



MR. JOHN McLEAN.

reputation for thorough, conscientious and skilful work in this and other allied branches of the building trade. The first terra-cotta fireproofing work for division walls, ceilings and roof construction in Canada was put in by him as contractor during the erection of the fine building of the New York Life Insurance Company on Place d'Armes, Montreal. Again, under the direction of Mr. A. T. Taylor, F.R.I.B.A., he was in the van—being first to lay marble mosaic floors—the first in Canada being put down in the banking room of the Bank of Montreal.

MR. W. P. SCOTT

represents a familiar figure in the building trade of Montreal, and but few in the trade have had a more marked success than he. Mr. Scott is a true Scotchman by birth, being a native of Edinburgh. Landing in New York, he pursued his trade with the leading designers and decorators of that city, and being possessed of considerable talent as an artist, and the indomitable push characteristic of the Scotch, has gained for himself a wide reputation as a designer and decorator.

Mr. Scott arrived in Montreal about 20 years ago and opened business on his own account, and from that time he began to step the ladder of success, and is now at the head of his profession in Montreal.

Mr. Scott is of a quiet, genial disposition, and possessed of a considerable amount of patience and the

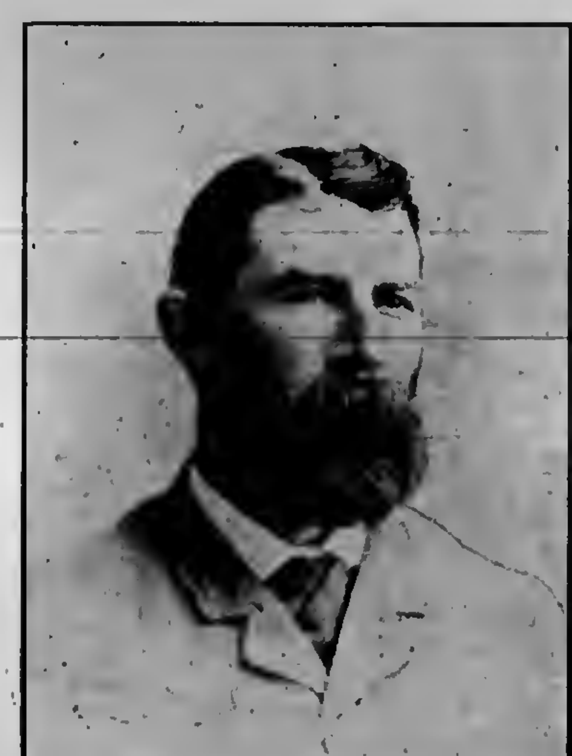
MR. W. P. SCOTT.

power to please, backed up by talent as an artist, and to these characteristics is largely due his success.

Among the large public buildings of Montreal there are many which bear witness to his skill.

MR. J. H. HUTCHISON,

who occupies the foremost rank as a masonry contractor, commenced business about 25 years ago, his first contract being the casing of the post office building at Portland, Maine. After a residence of three years in Portland Mr. Hutchison returned to Montreal, and in connection with Mr. Daniel Wilson built the Windsor Hotel. On the completion of this work he again engaged in business on his own account. He built the Redpath Museum, and also constructed the first ice palace in Montreal. Mr. Hutchison's yards, situated



MR. J. H. HUTCHISON.

on Seminary street, cover an area of 4,000 square feet. He owns an extensive machinery plant operated by steam, and gives employment to a large number of workmen. Among the important buildings which he has erected may be mentioned the Redpath Museum, Temple Building, Board of Trade, High School, St. James and Erskine churches, Queen's Hotel, and the residences of Lord Mount Stephen, Sir Donald Smith, R. B. Angus, R. G. Reid and Hugh Graham.

POINTERS FOR CONTRACTORS.

By H. T. F.

"Order is heaven's first law; and this confest,
Some are, and must be, greater than the rest."—POPE.

THE couplet is true on both counts, and particularly so as regards contracting and contractor. "Order" is the first requirement, and this quality faithfully carried out, marks the contractor as "greater than the rest." Order, in the preparation of estimates and order in the manner of conducting his work when once a contract is obtained, will most assuredly lead to a large measure of success in business. It may be asked, however, "What is order when applied to contracting?" I will endeavor to give my view of "order," as maintained by the successful contractor.

A well digested method in making out estimates is the first element of success, and to arrive at this method considerable brain effort must be expended, and some clerical labor employed. A proper list of everything required about a building must be prepared—preferably in alphabetical order—with prices of the material given, and where possible, price of labor in setting or finishing in part or whole. To this must be added cost of delivery in the works, insurance, and a fair percentage for contingencies. The orderly estimator will first take a survey of the ground on which the building is to be erected; he will consider the means of getting his materials on the ground. Then he will find out, by actual measurement, the amount of excavation necessary, and the distance he has to remove such earth as must be carted away. The amount of stone and brickwork, the number of yards of concrete or cement floor required, and all the drain tile will be counted up; each kind and quantity charged in the estimate under its own heading. So with everything about the building, timber, nails, paint, glass, plastering, hardware, and the thousand and one other things necessary to complete the contract; everything charged in its proper place accompanied by such remarks as may be deemed pertinent. And, at this point, let me remark, that seventy-five per cent. of the troubles that befall the country contractor at least—and this applies also in large measure to contractors everywhere—are due to ignorance or disorderly est[illegible]ting.

[illegible] things the young contractor should avoid, are, [illegible]nd disconnected estimates, and the acceptance of [illegible] another man's figures, unless that man is an ex[illegible]nd paid for preparing the figures. The unwary co[illegible]r who has no confidence in his own figures, be[illegible] an easy prey to the unscrupulous owner, who do[illegible] care a snap who loses money so long as he ge[illegible]work done at a low figure. A contractor who all[illegible] desire to get the "job," or whose necessities im[illegible] to take the work for whatever he can get for it, [illegible] on the brink of ruin, and is sure to be crowded to [illegible]ion by the time—or before—the works are fini[illegible] Be sure your figures are right; knowing this [illegible]em to your mast, as it were, and stick to ther[illegible]e end, unless you find you have omitted som[illegible] rendering your tender too low; then ask to be a[illegible]o add the deficiency, and if not permitted, with[illegible]m the contest. It is not often, however, that [illegible]rly estimator overlooks an item of material or a[illegible] labor.

Th[illegible] having been awarded, immediately set to work [illegible]de materials, so that as soon as operations [illegible]ce, there need be no cessation for lack of stuff [illegible] completion of the building. Make a full and complete set of bills of material, taking the quantities from the estimate, and BE SURE you get what you order, both in quality and in quantity. If you use any stone, arrange to pay for it as measured in the wall—100 feet to the cord. Of course, dimension stone will be paid for by the foot, or as may be agreed upon. Look carefully after your brick during delivery, and see that you do not get more than your proper allowance of "bats" and "soft bricks." House your lime as soon as it is on the ground, and be sure you get the quantity you are billed with. Keep an eye on everything you have placed on the ground. Overhaul your lumber bills and have the number of joists, studs, rafters and all dimension stuff, tally with your order and with your bills. Do this without delay, so that discrepancies may be adjusted while the matter is fresh. Make arrangements with your painter to have all shop work primed as soon as it leaves the workman's hands. The plasterer and plumber should be engaged to start their respective labors when required, in order to have the work continue without a break. All these things being arranged in an orderly manner, the next thing will be to commence work.

The first actual work will be to excavate for cellar. The contractor must first lay out the size of excavation and start his laboring men to work, either under his own supervision, or that of a competent foreman. In either case the exact time of each man should be kept in a time-book prepared for the purpose, and each man on the work should also be provided with time slips similar to the one given below, in which a daily record will be kept of the doings of each workman, including date, time, for whom the work was done, and the description of work: these slips do not cost much, and I dare say they may be had at the office of THE CANADIAN ARCHITECT AND BUILDER. Their advantage and usefulness cover much more than their cost, and are a sure preventative to subsequent disputes regarding time and wages. They should be handed in to the contractor, or his clerk, at least once a week:

STUB.	WORKMAN'S TIME SLIP.		
No. 10. ....189..	No. 10. ....189.		
	Work Done This Day by		
.... (Workman's Name.) for .... Contractor, etc., on John Doe's cellar, excavating and moving stones, 8½ hrs.	For Whom.	Description of Work.	Time.
	John Doe...	Excavating cellar and moving stones.....	8½ hours.
(----2¼"----)	(--1⅛"--)	(-----2⅜"-----)	(--1.0"--)

The stub may be kept by the workman, while the slip should be kept on file after the time has been properly charged on the one hand and credited on the other.

By adopting a system of this kind, or one similar, the contractor may know every day, if desired, just how the work is getting along financially. In adopting this method of getting at the actual cost of any work it does not follow that another piece of work of a similar kind will cost exactly the same amount. The knowledge gained to-day by actual experience is not sufficient for an estimate to be made six months or a year hence; and, accordingly, the contractor must be constantly laying about him for new ideas, ever on the alert to take advantage of new methods and ready to make application of these novel plans that are constantly being put forth to facilitate work and reduce cost. It is impossible for the non-progressive contractor, who still adheres to the methods of twenty-five years ago, to compete with men whose organ of order is largely developed, and who are alive to every modern innovation if it gives promise of advancing his interest.

Besides adopting the foregoing method of time keeping, the contractor should have a slip for his own use, which might be termed "A Memorandum of Estimate.

and Costs." This memorandum should be for the purpose of noting results and comparing them with first estimate in order to discover lapses or discrepancies. In my own practise, when contracting, I found this system of great utility in giving a definite to every transaction connected with the work in hand, which served me well when making estimates on other buildings. I give herewith a form that is generally employed for this purpose:

MEMORANDUM OF ESTIMATE—COST FOR MR. J. DOE'S HOUSE.

..........................189..

Various Service and Material.	Quantities.	Original Estimate.	Bid.	Cost.	Profit.
Cost Preparing Estimate and Expenses					
Grading and Excavating					
Quarried Stone					
Mason Work					
Dimension Stone					
Brick and Terra-Cotta					
Bricklayer					
Grates					
Ranges and "Set Stoves"					
Heaters					
Heating Pipes, Radiators, etc.					
Registers					
Mantels					
Tiles and Tile Floors					
Outhouses					
Pavements					
Carpenter Work					
Lumber					
Factory Work					
Porches and Verandahs					
Fences					
Hardware					
Painting and Glazing					
Plastering					
Plumbing					
Gas Pipes and Fixtures					
Electric Wiring and Fixtures					
Roofing					
Tin and Galvanized Iron Work					
Iron Fencing and Cresting					
Cellar Floors					
Cement Work					
Teaming and Carting					
Laborers' work					
Permits and other Legal Matters					
Paperhanging					
Personal Expenses					
Percentage					
Insurance					
Miscellaneous					

Here the contractor may tell at a glance what any piece of work cost him, and he may be able to judge from this what any similar work is likely to cost him, though, as before stated, it will not do to accept blindly as the probable expense of one piece of work because a similar piece previously cost a certain sum. No matter how much alike two pieces of work may be in style, material and surroundings, there will always exist conditions that will make differences of cost. This is a well-known fact among experienced contractors.

The great leak that is so often found in contractors' affairs is generally to be looked for in the labor department. When I say "labor department" I do not confine myself to the laboring man,—the man who works with pick and shovel,—as a rule he performs his part well and honestly, and his pay is small; I mean the loss is mostly found in the pay sheet of the high-priced mechanic, chiefly because he has not been handled properly. After the quality of order in a contractor, should follow a knowledge of men and an ability to lead them to successful endings. There should be no delay in paying their wages. If any portion of wages due the mechanic is held back from any cause, that mechanic at once becomes a creditor of the contractor and can not, from the very nature of things, feel bound to do more for his employer than his own ideas and inclinations will permit. Prompt payment of wages does much towards making prompt and industrious workmen. Be prompt and correct in all your dealings with men in your employ, then you may expect to receive prompt and effective service, for you hold the right to exact it.

In letting sub-contracts, it is usual to pay the sub-contractor in the same ratio as the contractor is paid. This, in all cases, should be understood in order to prevent disputes. It is always better for a contractor to sub-let the work of heating and plumbing, but in doing so it should be understood that all the work must be done in accordance with the demands of the main specifications and drawings, but if there are no drawings showing the system of piping for the heating and plumbing, with radiators, registers, baths, sinks, taps, vents, etc., a plan should be prepared before the work is let, and this plan should be approved of by the architect or by the owner if there is no architect employed. I must warn the young contractor here concerning the matter of heating and plumbing, and advise that if he has had no experience or a very little experience in these branches, he should take no definite action about them until he has got the opinions of some person or persons who have had a lengthy experience. Indeed, in preparing an estimate, when much plumbing is to be done and where a system of heating is to be placed in the building, it is always the wisest plan to submit the drawings and specifications to some experienced person in the business, and have him estimate on the work and say what he will do it for. The figures secured, it is well to add from 5 to 10 per cent. to them to cover the contingent expenses that are sure to arise. If the mason work, painting, and portions of the work are sub-let for fixed amounts, do not forget to add a percentage to the amounts to be paid to sub-contractors, for it must be borne in mind that you cannot be responsible for another man's work and see that he performs his proper duties, without an expenditure of time, labor, and money.

Having received and accepted the most suitable bids for the various works, and added them to the figures estimated for the work you intend undertaking yourself, the next thing will be to add an additional 5 or 10 per cent. to the whole amount, which sum should represent profit above all and every expense in connection with the contract. If this amount, or a greater one, does not result from the work when completed, it can not be said that it was a profitable contract, as business matters go.

I would like to say right here that no sensible contractor ever "jumps" at the cost of a building and takes the work at the figures he gives, neither will he adopt the method of "cubing" in making an estimate that he intends to use when tendering for a piece of work. Cubing may do well enough in experienced hands for making an "approximate" estimate of the cost of a building, but proves a snare and a pitfall, if relied upon as being exact.

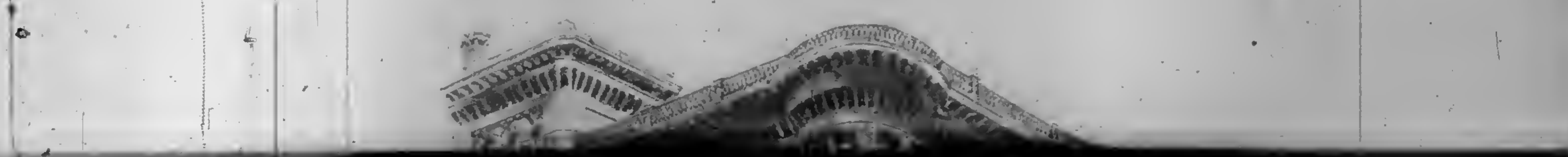
Besides the blank forms presented in the foregoing, there are many others that are used by contractors in their practice, varying according to the character of work and its locality.

At the annual meeting of the Owen Sound Portland Cement Co., held at Owen Sound on the 22nd December, the following officers were elected for the current year: John Lucas, President; J. E. Murphy, Vice-President; R. P. Butchart, Manager; W. P. Pie on, Director; Geo. S. Kilbourn, Secretary-Treasurer.

The Pedlar Metal Roofing Co., of Oshawa, will be pleased to send architects and others inte illustrated catalogues of their various lines of facture, including metal ceilings, shingles, sidings corrugated iron, sheet metal building fronts, etc. book of art ceiling designs is worthy of special m

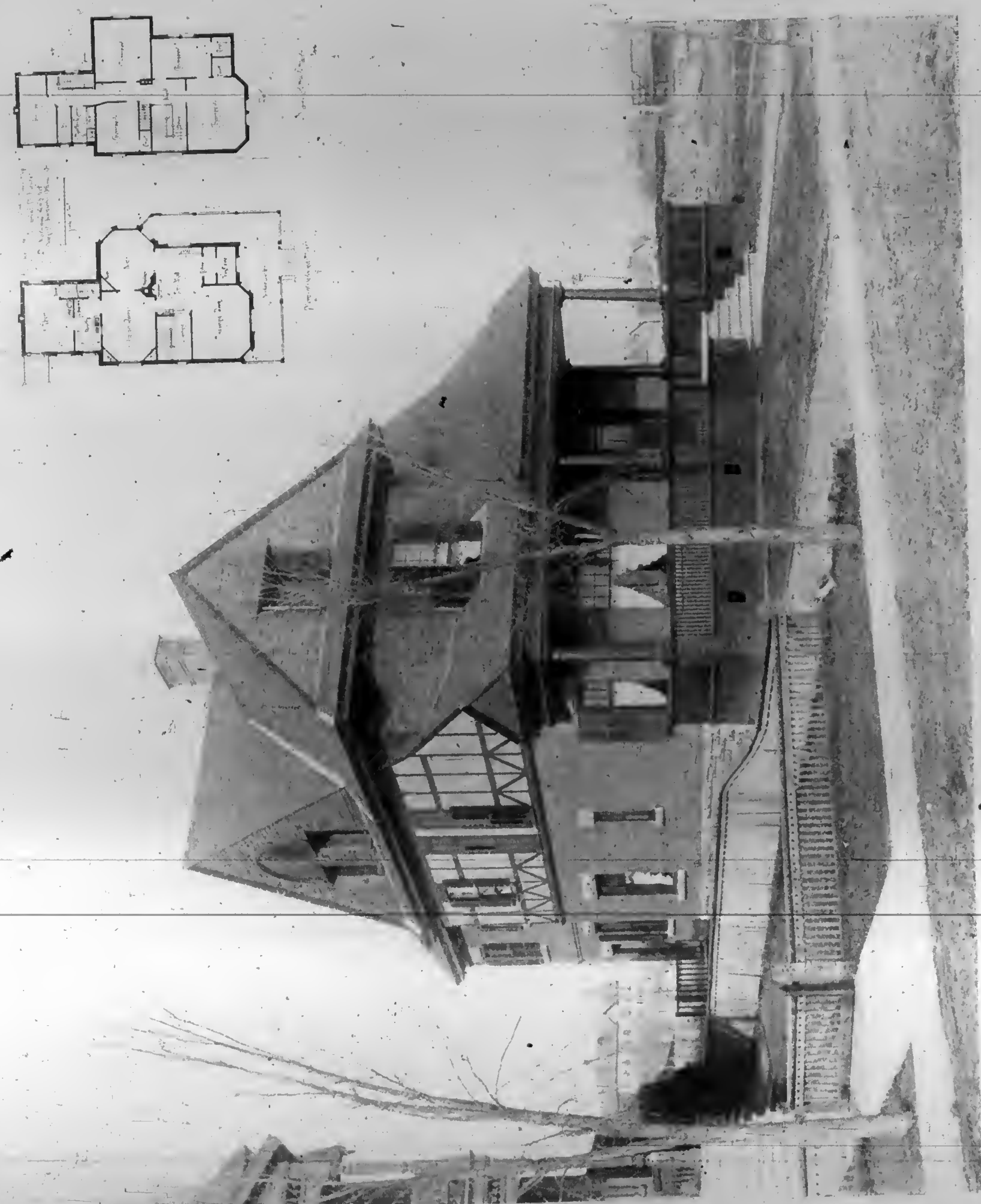
The annual election of officers of the London Plumbers' Association was held on the 17th of ber, with the following result: W. H. Heard man of Dominion Sanitary Committee), Presiden Smith, Vice-President (re-elected); Jas. Gre 2nd Vice-President; Thos. Partridge, Treasure Skelley, Jr., Secretary; Chas. Walker, Sea Arms.

Messrs. F. B. Dakin & Co., of Iberville, P. just completed a contract with the Sanitas Mf Boston, to manufacture their patent closets fo Messrs. Dakin & Co. are making some very and nice working closets, among them a syphon wash-down, which promises to sup wash-outs now so generally used. Archi tractors and plumbers should look into their



THE "TEMPLE BUILDING," BAY STREET, TORONTO.

GEO. W. GOUINLOCK, ARCHITECT.



RESIDENCE AT OTTAWA.
E. L. HORWOOD, ARCHITECT.

SUMMER RESIDENCE.

R. FINDLAY, ARCHITECT, MONTREAL.

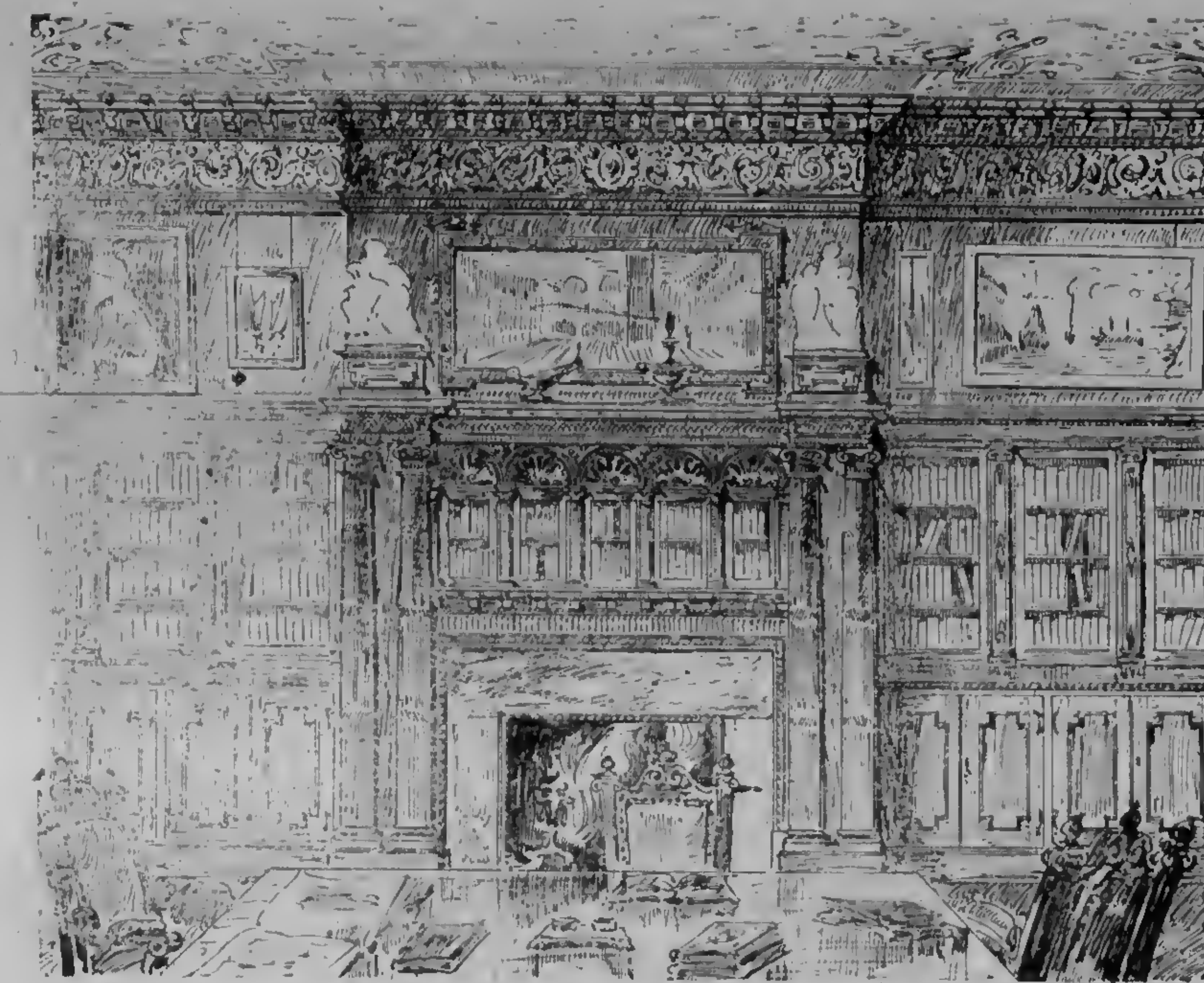
RESIDENCE, ROSEDALE, TORONTO.

DICK & WICKSON, ARCHITECTS.

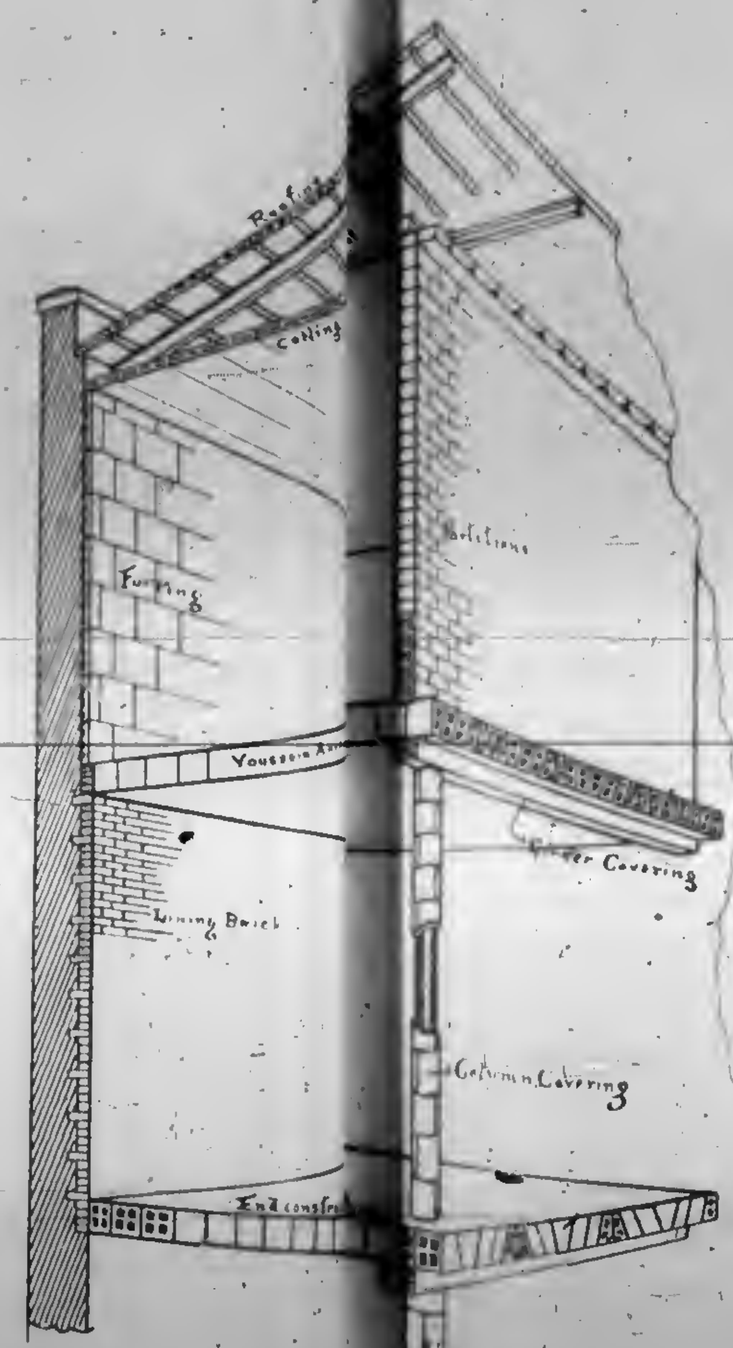
HOLY TRINITY CHURCH, WINNIPEG.
CHAS. H. WHEELER, ARCHITECT.

TERRA COTTA MANTEL.

TERRA[illegible] DORMER.



HARDWOOD MANTEL AND BOOK-CASE.



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—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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A Statue of The Queen.

DURING the last month the suggestion has been made that Toronto should erect a statue of the Queen in commemmoration of Her Majesty's Jubilee. The idea should be acted upon, though not with such haste as would be necessary to satisfy the desire of the daily paper that wishes to see the statue in situ on the 21st of June next. It may be possible to buy a "ready made" statue, but the wisdom of so doing is open to question. We should like to see instituted a properly arranged competition for designs, in which Canadian artists and sculptors would be given an opportunity to display their best talents.

The Toronto Chapter of Architects.

THE inaugural meeting of this new society was a gratifying success. The officers have had much experience in connection with the Ontario Association of Architects, and can be relied on to do everything that should be done for the success of the organization. They will bear in mind also that upon the success which may be achieved by the Toronto Chapter will depend whether the step taken by the architects of Toronto shall be followed by those of other cities throughout Ontario. The movement, if properly supported, should be the means of awakening greater interest in architectural matters, while at the same time broadening the influence and usefulness of the Ontario Association of Architects.

Architectural Education in Great Britain.

THE Society of Architects of Great Britain will renew its efforts to secure the passing of the Architects' Registration Bill at the next meeting of Parliament. The president of the society, in his address at the opening meeting recently, thus expressed himself on the the subject: "The bill now 'hung up' and awaiting the opening of Parliament is a measure having for its object the removal of evils which affect the best interests of both the public and the profession. I therefore bespeak for it your continued, persistent, and earnest efforts to place it on the statute book, as a fitting recognition of the sixtieth anniversary of our good and gracious Queen's reign, in the hope that that year may be signalized by placing architectural art and practice on a high level of educational distinction, insuring that all aspirants for the profession shall enter upon their pupilage with a thorough equipment calculated to develop genius on the lines of truth, to foster art and promote science—an alliance which will result in the growth of strength, fitness and beauty as a leading and general characteristic of the designs of the future. The evils arising from incompetency, which are acknowledged by all to exist, will be, meanwhile, gradually eliminated by the gentle hand of Time, without harshness, or what Parliament would designate injustice."

VOL. X.

THE pressure upon our columns last month precluded mention of the fact that we have reached the tenth anniversary of the first publication of the CANADIAN ARCHITECT AND BUILDER. The journal was launched with considerable misgivings in view of the expressed opinion of a number of leading architects that the undertaking could not succeed, but notwithstanding with a certain amount of assurance on the part of the publisher that he had rightly estimated the situation. The cordial reception accorded to the first number, crude as it was in many respects, proved an incentive to perseverance in the undertaking and to efforts for improvement. For a year each number of the journal consisted of 16 pages of letter press and 2 pages of illustrations 15½ by 10½ inches in size. With the beginning of the second volume, the pages were reduced to their present size. Their number has, however, been increased from time to time, until at present the regular numbers consist of 36 pages of letter press and 5 sheets of illustrations.

During the first two years of publication of the CANADIAN ARCHITECT AND BUILDER as a monthly, the need of more frequent publication of information relating to contracts became apparent. To supply this requirement the publication of the CONTRACT RECORD as a weekly edition of the ARCHITECT AND BUILDER was commenced in January, 1890. This weekly edition has, like the monthly, been doubled in size, yet no advance has been made in the subscription price originally fixed for the monthly alone. Under these circumstances it is not to be wondered at that the journal has steadily developed in circulation and influence, so that the principal architects, civil engineers and contractors throughout the Dominion are on the list of its subscribers.

As showing the estimation in which the journal is held by its subscribers, we have pleasure in printing the following testimonial letters received since the publication of our New Year number:

"I must express my pleasure on receiving the New Year number of your paper as well as testifying to the usefulness of your regular numbers in my business, the general information is always correct and the special articles most useful and interesting. I would not be without your paper in my office and trust the coming year may be one of unprecedented success."—E. C. ARNOLDI, Ottawa.

"We beg to state that we think the New Year number of your paper is first-class."—ELLIOT & HOPSON, Halifax.

"I have a real pleasure in expressing my high appreciation of the New Year number of the CANADIAN ARCHITECT & BUILDER,—the illustrations, matter and materials, combining to make it a production of which you may well feel a reasonable pride—the large sheet of illustrations of the Parliament and Departmental Buildings being exceptionally good. As regards your regular numbers I have observed a steady improvement ever since it was first published, and I look forward with pleasure to its arrival as giving me the best and most reliable acquaintance with the buildings throughout the Dominion—built, or in course of construction—and keeping me in practical touch with all the ruling rates for building materials, &c., and also, in this wide Dominion, it is no small satisfaction to find one's self in touch with the best thoughts and ripest experience of professional confreres which is finding so free expression in the columns of your journal. I wish the publication every success."—FRED J. ALEXANDER, Architect, Ottawa.

"Your New Year number of the CANADIAN ARCHITECT is a credit to you, the illustrations being an evidence that architecture is still a fine art. I hope to see you continue the good work, and strive to attain a better professional feeling amongst the members of the craft. Wishing you every success."—E. L. HORWOOD, Architect, Ottawa.

"We are very much pleased with the improved appearance of the CANADIAN ARCHITECT & BUILDER this year. We also consider the CONTRACT RECORD a very useful addition, as it gives the current prices of materials for building purposes, which otherwise causes inconvenience to obtain. Wishing you the success you deserve."—THOS. KENNEDY & CO., Barrie.

"I have pleasure in expressing my appreciation of the CANADIAN ARCHITECT & BUILDER and the services which it has rendered to the cause of Architecture in Canada. In this widely scattered country it is practically the only means which architects have of knowing what their brethren are doing in the different provinces. It is also a valuable medium of communication between architects and manufacturers. There has been a steady improvement in the literary matter as well as in the illustrations, until now it compares most favorably with any paper of its class. The New Year number I think particularly creditable."—D. B. DICK, Architect, Toronto.

"We have been subscribers to the CANADIAN ARCHITECT AND BUILDER since its first issue, and have been pleased to notice it's improvement each year. Permit us to compliment you upon the high character of your New Year number. We think it compares very favorably with the high class American journals."—WM. & WALTER STEWART, Architects, Hamilton.

"Allow us to congratulate you upon the New Year number of the CANADIAN ARCHITECT AND BUILDER. We have noticed with pleasure the continual improvement in the Journal since its commencement, until it has now reached the high literary and artistic standard evidenced by the New Year's number. Every Canadian architect and builder should be a subscriber for your valuable paper."—GORDON & HELLIWELL, Architects, Toronto.

"We take great pleasure in saying that we have found each issue of the CANADIAN ARCHITECT AND BUILDER of very great interest and are much pleased with the artistic cover of the New Year number. The reading matter is much greater in quantity, and we might also say of better quality, than some of our journals costing three or four times the money."—BURKE & HORWOOD, Architects, Toronto.

"On receipt of the New Year number of the CANADIAN ARCHITECT AND BUILDER, I was much pleased with the marked improvement over former years, and congratulate you on its success as an up-to-date professional Journal, and with the CONTRACT RECORD, an advertising medium of great scope and a good reference."—JOS. W. POWER, Architect, Kingston, Ont.

"Please accept my congratulations upon the handsome appearance of your New Year number. The illustrations I think are excellent, while the reading matter is as usual interesting. Your sustained efforts to provide a journal devoted to the interests of architects and builders, worthy of the importance of those interests, is most commendable, and certainly entitles you to all possible support from Canadian architects and builders."—HARRY STAVELEY, Architect, Quebec.

"We have a complete file of the CANADIAN ARCHITECT AND BUILDER, and consider it a most valuable work. We highly esteem its course in matters relating to the honorable practice and advancement of the profession in this country. Wishing you deserved success for your noble work."—BERLINGUET & LEMAY, Architects, Quebec.

"Regarding the merits of the CANADIAN ARCHITECT AND BUILDER, I beg to say, I cannot add anything to my former testimony, that it is a very excellent publication, and I congratulate you upon the artistic appearance of the New Year number, just to hand. Wishing you further success."—GEO. W. GOUINLOCK, Architect, Toronto.

"The extra quantity of reading matter and illustrations makes the New Year number of the CANADIAN ARCHITECT AND BUILDER one of unusual interest, but to know the full merit of your valuable publication, one must read it all the year round. This I shall continue to do, as well as direct the attention of tenderers on my plans to the advertisement pages."—D. OUELLET, Architect, Quebec.

"The only words I can say regarding your New Year number are those of pure admiration; from cover to cover it is a triumph of artistic production, and the amount of historical matter makes it doubly valuable. The catchy, pithy write up and the design of each "ad" is specially worthy of commendation. In regard to the regular numbers I have always felt that our supply sources are not sufficiently represented in the advertising pages. An architect will invariably refer to those pages and then to the catalogues afterwards. There is always an impression of reliability given by an advertisement in the CANADIAN ARCHITECT AND BUILDER, and personally I have specified many things, such as Steel Clad Baths and Mica Covering on the mere idea of their value I got from your pages. All supply dealers and manufacturers should have a card there, and every contractor should read the paper, and especially that paragon of usefulness, the CONTRACT RECORD."—DAVID G. BAXTER, Architect, Stratford, Ont.

Regarding the future, we have only to say, that as in the past, a constant effort will be made towards improvement. We earnestly solicit the active co-operation of our readers in an endeavor to further advance the scope and value of the CANADIAN ARCHITECT AND BUILDER.

THE EGYPTIAN PYRAMIDS AND THEIR BUILDERS.

THE first lecture of the course organized this winter in Montreal by the Province of Quebec Association of Architects was delivered on Jany. 22nd, in the Art Gallery, before a crowded audience, by Mr. S. H. Capper, the recently appointed Professor of Architecture at McGill University, who took as his subject, "The Egyptian Pyramids and Their Builders." The chair was occupied by Hon. George Drummond, and at the close of the lecture, which was illustrated by a very interesting and complete set of lantern views (part of the equipment provided for the Chair of Architecture by Mr. Wm. C. McDonald, its founder), a hearty vote of thanks was accorded to Professor Capper on the motion of Mr. Andrew T. Taylor, President of the Association. The following is an abstract of the lecture, for which we are indebted to the kindness of the author:

After noting the physical characteristics of Egypt, which, as an habitable country, consists solely of the bed of the Nile, rendered fertile by the annual inundations of the river, Professor Capper first dealt with the ethnology of the ancient Egyptians. At the furthest point to which we can trace them back in their monuments, some six thousand years ago, there appear to be two, if not three, distinct races in Egypt, of which the dynastic race, probably the latest invaders, would seem to be allied to the ancient Phoenicians. It is surmised that these 'Punic' tribes, leaving their original home on the Persian gulf, made their way along the coast up the Red Sea, whence, crossing over into the Nile Valley, they conquered and occupied Egypt, becoming the dynastic race known to us in a long and magnificent succession of sculptured monuments. Other waves of this great tide of migration and conquest settled on the coasts of Philistine and Syria (the Philistines of Biblical history being one branch) and made their way further west to the famous settlement of Carthage and its offshoots in the extreme west of the Mediterranean. The Egyptians, when they first become historically known to us, are a people in a very high state of socially organized life, perfectly acquainted with the arts of masonry and sculpture, of carpentry and turning, of working in copper, of pottery-making, glazing, weaving and dyeing; in many respects their workmanship and works have never been surpassed by anything man has accomplished since their day.

Egyptian history begins for us with the fourth dynasty of kings, dating from the earliest years of the fortieth century before Christ. To the time immediately anterior to this dynasty the 'Pyramid of Degrees,' or Stepped Pyramid, of Sakkara is generally ascribed.

Within the last few years the Pyramid of Sneferu, first king of the 4th dynasty, has been identified at Medum and thoroughly explored. Though much ruined, it is in some respects better preserved than the more famous Pyramids of Gizeh; in particular the temple, attached to every pyramid on the eastern side, has in this instance been completely preserved, buried under piles of debris. The Pyramid at Medum, known to ancient Egyptians as 'Kha,' is a most interesting link, showing the development of the true pyramid from the truncated form known by the name of 'Mastaba.' This pyramid and that at Sakkara are the only instances of successive enlargement, the 'accretion theory' of pyramid-building being shown to break down when applied to the great Pyramids of Gizeh. Further, the Pyramid at Medum was the direct model followed by Sneferu's successor, Khufu, when he built his much grander pyramid at Gizeh, the one having been brought to the true pyramid by a final layer or casing, built at a totally different angle from the original slope of the 'Mastaba' core, while the other was built directly to the true pyramid angle. The dimensions of Sneferu's Pyramid are: height, 7 × 25 cubits; side of square base, 11 × 25 cubits; those of Khufu's—'The Great'—Pyramid at Gizeh being precisely similar, with a length of 40 cubits substituted for the 25 cubits of the earlier monument. This ratio of height to base-circuit, viz., 7 to 44, is precisely equivalent to the nearest simple approximation of the ratio of the radius of a circle to its circumference; and this theory of pyramid building seems to be well established by the most accurate measurements of modern times. The theories and paradoxes sought at various times to be established in regard to the Great Pyramid, are almost innumerable; in comparatively recent times they have been chiefly associated with the name of Professor Piazzi Smyth, of Edinburgh, whose excellent work of solid investigation is sadly marred by the fanciful theories in which the learned explorer allowed himself to run riot. Within the last few years Mr. Flinders Petrie has given accurate data for the first time to the world, the result of a most painstaking scientific research, illumined by great critical acumen; and in the works of this eminent English Egyptologist are to be found the most recent and most authentic statements of our present knowledge on the subject.

Turning to the pyramids of Gizeh, the lecturer was compelled by want of time to limit himself to a description of the Great Pyramid, built by Khufu, the second king of the fourth dynasty, and known to the ancient Egyptians as "Akhet." It is one of the largest and—when completed—loftiest buildings achieved by man, covering some 13 acres, with solid masonry, and attaining a height of 481 feet. The side of the base is (within two or three inches) 756 feet long. The accuracy of workmanship is probably unrivalled in all human building. The most careful modern measurements, taken with instruments of scientific precision, prove that the accuracy of levelling of the casing-stones of the Great Pyramid is equal to "most modern opticians' straight edges" of an equal length; while the descending entrance passage, partly built, partly driven through solid rock to a total length of some 350 ft., reveals an error of less than one-quarter of an inch in the sides and of three-tenths of an inch along the roof. This extraordinary accuracy, however, which is far greater than anything attempted in modern masons' work, is not true of the uppermost chamber within the pyramid, which is considerably out of level, a fact that would seem to indicate that the master-builder or architect had passed away before the completion of his work, leaving it to less careful successors to finish. Mr. Flinders Petries' researches had thrown great light on the mechanical methods of the pyramid builders and the organization of labor. The remains of what were believed to be the barracks of the workmen still existed on the west side of the Second Pyramid, quite adequate to house from 3,500 to 4,000 men. In all probability some such staff of skilled masons would be employed continuously; while during the period of the Nile inundation, when agricultural work was at a standstill and the people ready and thankful for employment, a special levy of perhaps a hundred thousand laborers would be requisitioned to quarry the stone on the east bank of the Nile, and convey it (by water) to the site at Gizeh. There is therefore great probability in the statement of Herodotus that 100,000 men were employed to build this pyramid, working during 20 years for 3 months at a time. Under the circumstances the pyramid building, far from being an oppressive exaction, would be a great scheme of public works, finding employment for the unskilled population at the season when they would otherwise be idle.

PERSONAL.

Mr. John E. Belcher, architect, of Peterborough, Ont., is at present visiting in England.

Mr. C. J. Gibson, architect, Toronto, has removed his office to the Janes building, corner King and Yonge streets.

Mr. A. G. McIntyre, a well-known Toronto contractor is about to remove to Berlin, Ont., where, with the assistance of a partner, he expects to do an increased business.

Mr. John Shaw, of the firm of Shaw & Gilkes, contractors, Winnipeg, died in that city on January 28th. Mr. Shaw had been a resident of Winnipeg for 16 years, having previously lived in Quebec.

Mr. Samuel Birch, of McKelvey & Birch, Kingston, Ont., has left for England, where he will spend a few months as expert for a Canadian firm interested in plumbing and heating in the great metropolis.

The firm Roy & Gauthier, architects, Montreal, has been dissolved, Mr. L. Z. Gauthier continuing. Mr. Victor Roy has formed a new partnership with Mr. Alp. Content, and the new firm will be known as V. Roy & A. Content.

MR. JOSEPH W. POWER.

We have the pleasure of presenting herewith a portrait and brief sketch of Mr. Joseph W. Power, the newly-elected President of the Ontario Association of Architects. Mr. Power may be said to be an architect by birth, association and education. His father, the late Mr. John Power, studied and practiced architecture in England, and subsequently on coming to Canada in 1847, located in Kingston and conducted a successful practice in that city for a period of 30 years. Mr. Joseph Power, after having completed a college course, and graduated as a C.E., entered his father's office as a student, and served the usual term under articles. In 1873 he was admitted to partnership in the firm, and assisted in the designing and construction of most of the business buildings erected in place of those destroyed by the fire which, in 1876, swept Princess street.

Since the death of his father in 1881, the business has been continued under the same name by Mr. Jos. Power, who has designed and superintended the construction of a number of the principal and most meritorious buildings of the city, notably the Opera House, St. George's Cathedral, St. Andrew's Church,

MR. JOSEPH W. POWER.
President Ontario Association of Architects.

the Locomotive Works, Collegiate Institute, Central School, Residence of Dr. Horsey, Mr. Pense, Major-General Cameron, the Rectory building, etc.

Mr. Power is a member of the Royal Canadian Academy of Arts, and has been a most active and efficient worker in the Ontario Association of Architects from the date of its organization until the present time. The honor which has been conferred upon him, by electing him to the presidency of the Association, is one which he has fairly earned and is well fitted to wear.

ILLUSTRATIONS.

SKETCH BY S. ARNOLD FINDLAY, MONTREAL.

STUDIO OF MR. R. DIXON PATTERSON, R.C.A., TORONTO.—DARLING, SPROATT & PEARSON, ARCHITECTS.

HALL IN RESIDENCE OF MR. R. DIXON PATTERSON, R.C.A., TORONTO.—DARLING, SPROATT & PEARSON, ARCHITECTS.

NEW DRILL HALL, HALIFAX, NOVA SCOTIA.—THOS. FULLER, CHIEF ARCHITECT, DEPARTMENT OF PUBLIC WORKS, OTTAWA.

PUBLICATIONS.

We are in receipt of nn attractive calendar issued by Mr. Alex. Bremner, contractors' supply merchant, Montreal.

We have received a copy of the 1897 edition of the circular of information of the School of Architecture, Scranton, Pa., containing a description of their method of teaching, details of courses of instruction in architecture, architectural drawing and designing; also sample pages of the instruction and question papers and reduced specimen drawing plates.

TORONTO CHAPTER O.A.A.

The first regular meeting of the above Chapter was held Monday evening, Feb. 8th, in the School of Practical Science. There were present, Mr. W. R. Gregg, chairman; Henry Simpson, sec.-treas.; Messrs. Wickson, Wright, Paull, Gibson, Edwards, Helliwell, Burke, Gray, Bishop, Hall, Harper, Gordon, Beckett, Boultbee, Heward and commander Law.

In his opening address Mr. W. R. Gregg threw out some valuable suggestions as to how the meetings of the Chapter might be conducted. He also gave the following list of old city buildings, with dates of their erection, the names of their architects, etc., which showed that Mr. Gregg had gone to very considerable trouble to make the first meeting interesting. So much was this information appreciated by those present that it was thought fitting to have it printed in this issue of the CANADIAN ARCHITECT AND BUILDER.

EARLY BUILDINGS, STILL REMAINING IN TORONTO, WITH DATES AND NAMES OF ARCHITECTS.

1829—Old Parliament Buildings, Front St. West.......J. Young.
1833—Dr. Christopher Widmer's House, Front St. E. J. G. Howard.
1843—Trinity Church, King St. East..............H. B. Lane.
1843—Commercial (now Merchants) Bank......J. G. Howard.
1844—Old City Hall, Front St. East..............H. B. Lane.
1844—St. George's Church, John St..............H. B. Lane.
1846—Lunatic Asylum, Queen St. West..........J. G. Howard.
1847—Church of the Holy Trinity, Trinity Square....H. B. Lane.
1848—Knox Church, Queen St. West..............Wm. Thomas.
1848—Oakham House, Church and Gould Sts.....Wm. Thomas.
1848—St. Michæl's Cathedral....................Wm. Thomas.
1848—House of Industry........................J. G. Howard.
1850—St. Lawrence Hall........................Wm. Thomas.
1851—Normal and Model Schools, Gould St.......Wm. Thomas.
1852—Court House, Adelaide St. East.....Cumberland & Storm.
1852—Trinity College..........................Kivas Tully.
1853—Yorkville Town Hall......................Wm. Hay.
1853—St. James Church, King and Church Sts. ... Cumberland & Storm.
1853—Old Post Office (now Inland Revenue Office) Cumberland & Storm.
1854—General Hospital, central portion..........Wm. Hay.
1854—Mechanics' Institute, now Public Library ... Cumberland & Storm.
1854—House of Providence......................Wm. Hay.
1855—Rossin House.........................Wm. Kauffman.
1856—St. Michæl's College and St. Basil's Chapel ....Wm. Hay.
1857—University of Toronto..............Cumberland & Storm.
1857—St. Stephen's Church....................Thos. Fuller.
1857—Osgoode Hall, central part and additions ... Cumberland & Storm.
1857—Model Grammar School (now Normal School) Cumberland & Storm.
1857—Masonic Hall, now Can. Permanent B'ld'g..Wm. Kauffman.
1857—Romain Building, King St. West...........Jos. Sheard.
1857—Cawthra Residence, now Molsons Bank......Jos. Sheard.
1858—Chapel St. James Cemetery........Cumberland & Storm.
1858—St. Paul's Church, Bloor St. East.....G. K. & E. Radford.

Mr. A. Frank Wickson's paper on "Sunday School Planning" was listened to with great interest, he having made a copy of the World's Fair Model Sunday School, which, though not applicable to every Sunday school building, showed clearly the main features necessary to proper Sunday school building generally.

The next meeting of the Chapter will be held in the same place on Monday evening, March 8th, at 8 o'clock. A very interesting program is being arranged for by the executive committee. Every architect belonging to the Association should make it a point to be present, as the formation of this Chapter will undoubtedly be of great educational value to those attending its meetings.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The semi-annual examinations for admission to study and for registration were held on Wednesday the 27th, and Thursday the 28th of January last, in the office of M. & X. Berlinguet, 209 St. John street, Quebec. Three candidates presented themselves, two from Montreal: Messrs. L. Lemieux, for registration, and E. Geoffrion for study; one from Quebec: Mr. Rene Frichet, for study. These three candidates have passed.

The McLeod street Methodist church, at Ottawa, was completed last month.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

AN UNAUTHORIZED PUBLICATION.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS,
MONTREAL, February 5th, 1897.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—A diary for this year has recently been published in Montreal entitled "The Canadian Architects' Diary," that has been sent gratis to a large number of architects and others.

From the reproduction of a part of a photograph group of the members of the Association of Architects of the Province of Quebec, and of a notice and portrait intended for the President of the Association, it might be inferred that the diary had the sanction and imprimatus of the Association.

This is not the case; on the contrary, unwarrantable liberties have been taken by the proprietors of the diary, not only with the Association, but with many of the individual members of it.

No permission was asked or given to publish the group of architects, and to make matters worse, only a portion of the original photograph was reproduced, causing it to be most imperfect and misleading, and leaving out many of the oldest and most respected members of the Association.

Invidious distinction doubtless was not intended, but has undoubtedly been made.

As far as can be learned the notices of the different architects were also put in without their knowledge or sanction.

It is only fair to say, however, that no payment whatever was asked or given for any of these notices.

Some might infer from the name of the diary that you had some connection with it; we are fully aware that you had not.

The Council regret exceedingly the occurrence of the whole matter and trust that this protest may be the means of preventing any repetition of it. I have the honor to remain,

Yours obediently,
JOS. VENNE, Secretary.

UNION BUILDINGS, 43 ST. FRANCOIS XAVIER STREET,
MONTREAL, January 20th, 1897.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—A copy of a recent publication called the "Canadian Architects' Diary" has, I understand, been sent gratis to all or nearly all the architects in Canada.

Permit me to say through the medium of your journal, the unduly prominent position given to me and my work was done entirely without my knowledge. The first information I had of the matter was on receiving a copy of the diary, and I was much distressed and annoyed to find the liberty that had been taken with my name and personality. I trust my respected confreres throughout the Dominion will exonerate me from any responsibility for a production that is in such palpably bad taste.

I have no doubt that the other architects of whom notices are given, were similarly ignorant of what was being done, and feel as indignant as

Yours obediently,
ANDREW T. TAYLOR.

[Referring to the above communications we desire to state that an effort was made by the authors to have sample pages of the publication referred to circulated through the CANADIAN ARCHITECT AND BUILDER, seemingly with the object of conveying to the minds of architects the impression that the publisher of the CANADIAN ARCHITECT AND BUILDER was connected with the enterprise. This effort, however, was not successful. We wish to disclaim connection of every kind with this unwarranted publication, and to express our regret that a number of the leading architects of the Dominion have suffered serious annoyance as the result of its appearance.—The Publisher CANADIAN ARCHITECT AND BUILDER.]

THE ONTARIO ARCHITECTS' ACT.

OTTAWA, December 14th, 1896.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—I have read with interest the different articles in your paper, re the Architects' Bill, which was before the local legislature last session, and which was thrown out at that time. I cannot help thinking that there are evils (unforeseen at present) which are sure to arise if such a bill is passed.

Of course there are several sides to everything, and I venture to point out one, which may not have been much discussed, viz: It must be granted that the legislature cannot alter the standing of Architecture as a profession if they passed fifty bills, for or against it; Architecture established itself at the head of the professions, long before legislatures, as we know them, were thought of, and is the greatest factor to show the civilizations and histories of the peoples of the world.

Where written histories have been destroyed and forgotten, the modern historian uses the ancients' architecture, and by its style and decorations, tells us the habits, religions and politics of peoples dead centuries ago.

Now sir, what I wish to suggest is this: As Architecture has lived and flourished for such a time, without aid from any but its own votaries, can we fondly believe that the profession will be elevated by the passing of an act of parliament? I think not; rather it may tend to retrograde that which it intends to elevate.

Looking at the matter from a more selfish point of view, I should like to point out as an illustration of what I mean, other professions which have been fostered by parliament. For instance, medicine, law, dentistry, pharmacy, etc. What has legislation done for them? It has done this—it has filled colleges with students, and the students are ever looking where they may, metaphorically speaking, lay their heads; on all sides we see these professions full to overflowing, and only a small proportion of these men can ever hope to make either success or fortune; the majority eke out a bare existence; the great cry of the time is "the professions are overcrowded."

Now, sir, my humble opinion is this: if such a bill passes parliament, students will be attracted and ground out of colleges in large numbers, as they now are from the other colleges, only to find too late, that the chances for fame and fortune are indeed small; and the bill, which on its face seems to make a closed corporation of all things architectural, has instead only served as a light to attract the moths it would fain keep away. As it now is, architects have the selection of students, and therefore the power to upraise the profession if they will only take enough interest in them to direct their studies and make them something more than tracing machines. Thanking you in advance,

Yours truly,
ARCHITECT.

["Architect's" letter (evidently inspired by a fear lest the act will bring in competitors) must be considered an effectual off-set to the usual cry that the promoters of the proposed amendment to the act are trying to keep out new architects.—EDITOR C. A. & B.]

PROPOSED LEGISLATION FOR ONTARIO ARCHITECTS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Your editorial in reply to a letter I wrote and which you published in a recent issue of your valuable paper shows to my mind the weak points in the Bill to be reintroduced at the next session of the Ontario Legislature.

Surely if it is desirable or necessary to apply for special legislation to compel men to pass certain examinations before they can be legally styled architects, it is to be assumed that there are at present some persons in Ontario trading on that title who are either a disgrace to a body of professional men or that by their incompetency the æsthetic feeling is shocked or the lives or limbs of the public are endangered; and is it not on this latter plea that special legislation is asked? Why

then should any architect who has the least respect for himself or the profession he has adopted, object to undergo the examination he so earnestly wishes to have imposed on the rising generation?

You mistake the import of my previous letter—I do not claim to be able to turn out students fully prepared to enter upon the practical work of superintending architects, but I do profess to be able to train young men to become efficient architectural draughtsmen in less time than such takes by the obsolete method of doing ordinary routine office work supplemented by the picking up of wrinkles as chance favors.

The clause in the Bill exempting two year's services in an architect's office to students of the School of Science looks as if that institution is in need of State crutches as well as of State funds for its continuance. If the object of the Bill is to ensure that well-qualified men, and those only, may practice the profession of architecture, I say by all means—1st, have the examinations; 2nd, have them conducted by either the government or the university in conjunction with specialists elected annually from the members of the profession; and 3rd, have different degrees; 4th, have the examinations open to all and honestly conducted; but, 5th, having a committee to investigate appeals.

It is not just to compel all students in the province to attend a school in Toronto for three years, but examine them there if no better place can be found, and grant the diplomas to all who can do the work without questioning where or from whom their information has been gained. You state that mine is a gloomy picture of a student's work in an office, but if space would permit I would give the statements of those who suffered, and the picture would be gloomy indeed.

You object to the word "self-dubbed"; so does every worthy member in the profession. Here is an example: only last week a carpenter enquired of me how long it would be before he could draw a plan; he stated his trade was not a desirable one, and as he was out of work he thought when building begins in the spring he would "'ang hout his shingle as ha harchitek." This man has evidently more ambition than knowledge; perhaps he may be a good workman under supervision, but as a supervisor he must fail. He further stated "that as a boy he disliked educational work and that if Tom ——— can make money as a harchitek, he could." On enquiry I found he had never worked a problem of geometry, he knew nothing of drawing, and virtually nothing of any building trade but his own. If his shingle appears, is the term "self dubbed" too expressive of contempt; if so, let it be "self styled."

You mention "vested interests"; kindly compare that to vested interests in cesspools. If the public demand their abolition he has to do away with them and adopt a system of sewage approved of by the public. Where safety is concerned vested interests often mean interests lost; all reforms press on some sore corn.

The statement I made in reference to students fares being paid to the United States is correct, as is also that in regard to obstacles being placed to prevent students from practising in Canada. If you wish for these details I will give them privately; it is inadvisable to publish names. You also infer that I have not shown due respect for the Ontario architects; on the contrary I have the highest respect for every educated man whose actions are above suspicion.

Yours respectfully,

S. JOHN IRELAND,
Principal Hamilton Art School.

THE PRESIDENT OF THE R. C. A.

THE Royal Canadian Academy of Arts, which includes in its membership a number of architects, was founded in 1880. In 1893, Mr. Robert Harris was elected President, and still occupies that position. We are pleased to be able to present to our readers the accompanying likeness and particulars of this interesting personality.

MR. ROBERT HARRIS, President of the R.C.A.

Mr. Harris, when a young child, came with his parents from Wales to Charlottetown, Prince Edward Island, where, at the Prince of Wales College he received his education. He qualified as a Provincial land surveyor, but manifested a strong inclination and adaptability for art, facilities for the proper study of which were altogether lacking at that period. After drawing and painting for several years without an instructor, direct from nature, he determined in 1877 to devote his life to art, and in pursuance of this purpose, entered the Slade School University College, London, under Legros, and afterwards the Atelier Bonnat, Paris. As might have been expected, his progress was rapid, and his style free and strong.

Upon his return to Charlottetown in 1878, Mr. Harris painted a number of pictures, some of which were sent to the Exhibition of the Ontario Society of Artists, of which society he was afterwards elected Vice-President.

He removed from Charlottetown and for two years had a studio in Toronto.

From 1880 to 1883 was spent in further study in Paris and Italy. In the latter year Mr. Harris returned to Canada, and opened a studio in Montreal, which city has since been his home.

Mr. Harris was a member of the Committee of Arrangements appointed to prepare a basis of organization for the Royal Canadian Academy, and the present prosperous condition of the society is in no small measure due to his labors on its behalf.

Mr. Harris was formerly an exhibitor at the Paris Salon, the Royal British Academy and other European art exhibitions. He was likewise an exhibitor at the World's Fair, where he was awarded a medal. Since 1893 he has not exhibited outside of Canada. He has given us many excellent Canadian landscape pictures, as well as historical and ecclesiastical pictures, but it is as a portrait painter that he has gained his chief distinction.

EXAMINATIONS OF THE O. A. A.

The examinations of the Ontario Association of Architects for 1897 will begin on March 15th, at 2 p.m. Students who intend to come up for examination should send their names to the Registrar without delay.

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It is possible to view the proportion between capitals and columns, or between capitals and piers—which are more often used by us than columns—as having some sort of law of fitness in their combination which may form a rough guide to their design.

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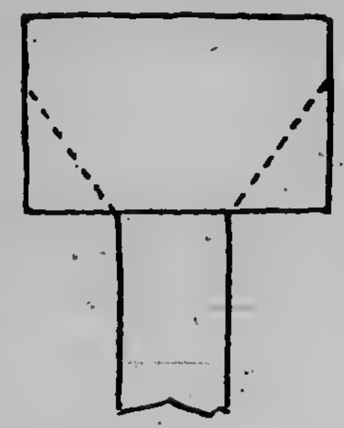

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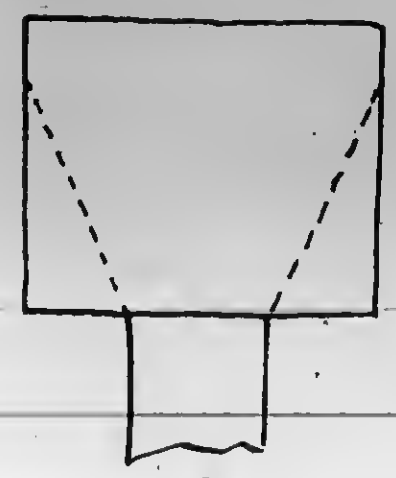
A column is a supporting wall gathered up into a small cylinder, and the use of the capital is to enable us to concentrate a large load upon the small cylinder. A block would do this, but it is more pleasing to the eye to cut away the useless part of the stone and leave the portion which does the work, and which is thus shaped in the most expressive way by the actual lines of energy. (Fig. 1). If the block is low in proportion to its width safety demands a deep abacus (Fig. 3); if high, the abacus may be narrower. (Fig. 2).



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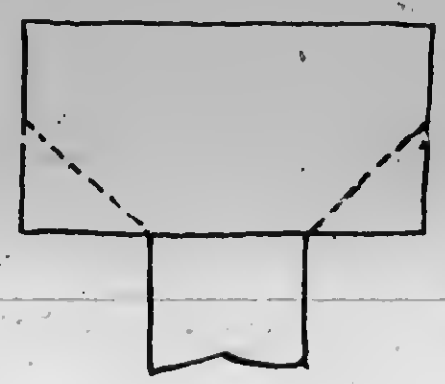

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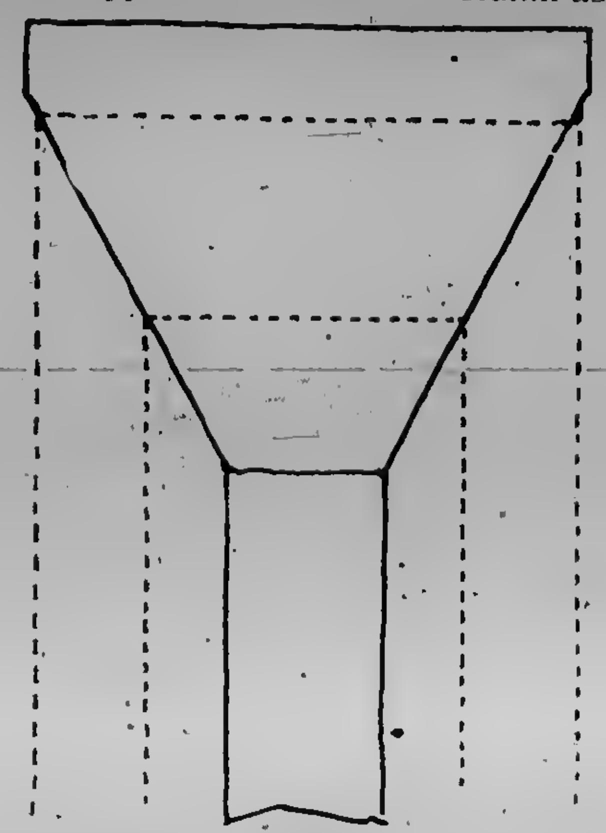
The form of capital and relation between capital and column may be varied in numberless ways, but the eye demands and is only pleased by forms and relations which express the structural facts. More than this, it likes to have them emphasized; and where there is small super-incumbent weight it is more pleasing to have the column small and even fantastic. For instance, in the Lombardic fronts of Pisa and Lucca, where the columns stand over one another for ornament and support nothing, it would cease to be ornamental and be merely dull if they were sober, business-like columns, instead of being as they are, small, inlaid, twisted, knotted, composed of a pile of animal forms, or even with the upper and lower parts looped together as if in tension. The capital, however, as stone is not strong in the transverse direction, cannot project far without having also a deep bell, so that for small columns we get this shape of capital, which you will recognize as being common in one-storey cloisters. And if we take this as a type of the small column, we can get from it the proper relation between capitals and columns of all thicknesses simply by drawing lines centred on the same axis, defining the width of the column we require.

It will thus appear that when the column assumes the proportions of a pier, the capital disappears, leaving only the abacus (Fig. 4)—and this seems to be right.



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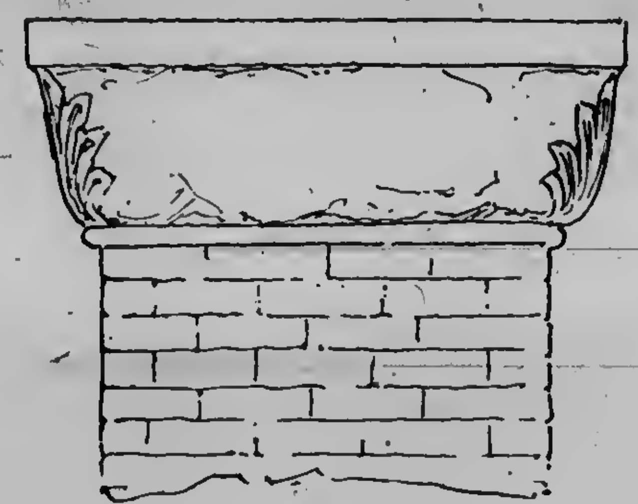
The heavy caps which we so often see on piers are a mistake, and have no expression. (Fig. 5). The designer seems sometimes to have considered himself forced into this form of cap on the pier so as to keep in line with the depth of cap on columns between the piers. But that is not necessary. The Italian method is simply to let the abacus do duty for a cap to the pier. (Fig. 6).*



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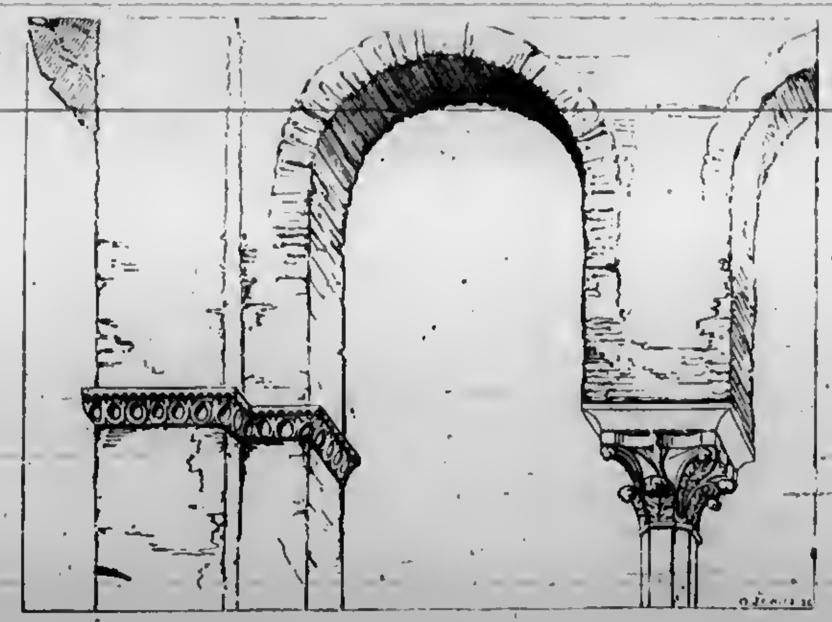

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then should any architect who has the least respect for himself or the profession he has adopted, object to undergo the examination he so earnestly wishes to have imposed on the rising generation?

You mistake the import of my previous letter—I do not claim to be able to turn out students fully prepared to enter upon the practical work of superintending architects, but I do profess to be able to train young men to become efficient architectural draughtsmen in less time than such takes by the obsolete method of doing ordinary routine office work supplemented by the picking up of wrinkles as chance favors.

The clause in the Bill exempting two year's services in an architect's office to students of the School of Science looks as if that institution is in need of State crutches as well as of State funds for its continuance. If the object of the Bill is to ensure that well-qualified men, and those only, may practice the profession of architecture, I say by all means—1st, have the examinations; 2nd, have them conducted by either the government or the university in conjunction with specialists elected annually from the members of the profession; and 3rd, have different degrees; 4th, have the examinations open to all and honestly conducted; but, 5th, having a committee to investigate appeals.

It is not just to compel all students in the province to attend a school in Toronto for three years, but examine them there if no better place can be found, and grant the diplomas to all who can do the work without questioning where or from whom their information has been gained. You state that mine is a gloomy picture of a student's work in an office, but if space would permit I would give the statements of those who suffered, and the picture would be gloomy indeed.

You object to the word "self-dubbed"; so does every worthy member in the profession. Here is an example: only last week a carpenter enquired of me how long it would be before he could draw a plan; he stated his trade was not a desirable one, and as he was out of work he thought when building begins in the spring he would "'ang hout his shingle as ha harchitek." This man has evidently more ambition than knowledge; perhaps he may be a good workman under supervision, but as a supervisor he must fail. He further stated "that as a boy he disliked educational work and that if Tom ——— can make money as a harchitek, he could." On enquiry I found he had never worked a problem of geometry, he knew nothing of drawing, and virtually nothing of any building trade but his own. If his shingle appears, is the term "self dubbed" too expressive of contempt; if so, let it be "self styled."

You mention "vested interests"; kindly compare that to vested interests in cesspools. If the public demand their abolition he has to do away with them and adopt a system of sewage approved of by the public. Where safety is concerned vested interests often mean interests lost; all reforms press on some sore corn.

The statement I made in reference to students fares being paid to the United States is correct, as is also that in regard to obstacles being placed to prevent students from practising in Canada. If you wish for these details I will give them privately; it is inadvisable to publish names. You also infer that I have not shown due respect for the Ontario architects; on the contrary I have the highest respect for every educated man whose actions are above suspicion.

Yours respectfully,
S. JOHN IRELAND,
Principal Hamilton Art School.

THE PRESIDENT OF THE R. C. A.

THE Royal Canadian Academy of Arts, which includes in its membership a number of architects, was founded in 1880. In 1893, Mr. Robert Harris was elected President, and still occupies that position. We are pleased to be able to present to our readers the accompanying likeness and particulars of this interesting personality.

MR. ROBERT HARRIS, President of the R.C.A.

Mr. Harris, when a young child, came with his parents from Wales to Charlottetown, Prince Edward Island, where, at the Prince of Wales College he received his education. He qualified as a Provincial land surveyor, but manifested a strong inclination and adaptability for art, facilities for the proper study of which were altogether lacking at that period. After drawing and painting for several years without an instructor, direct from nature, he determined in 1877 to devote his life to art, and in pursuance of this purpose, entered the Slade School University College, London, under Legros, and afterwards the Atelier Bonnat, Paris. As might have been expected, his progress was rapid, and his style free and strong.

Upon his return to Charlottetown in 1878, Mr. Harris painted a number of pictures, some of which were sent to the Exhibition of the Ontario Society of Artists, of which society he was afterwards elected Vice-President.

He removed from Charlottetown and for two years had a studio in Toronto.

From 1880 to 1883 was spent in further study in Paris and Italy. In the latter year Mr. Harris returned to Canada, and opened a studio in Montreal, which city has since been his home.

Mr. Harris was a member of the Committee of Arrangements appointed to prepare a basis of organization for the Royal Canadian Academy, and the present prosperous condition of the society is in no small measure due to his labors on its behalf.

Mr. Harris was formerly an exhibitor at the Paris Salon, the Royal British Academy and other European art exhibitions. He was likewise an exhibitor at the World's Fair, where he was awarded a medal. Since 1893 he has not exhibited outside of Canada. He has given us many excellent Canadian landscape pictures, as well as historical and ecclesiastical pictures, but it is as a portrait painter that he has gained his chief distinction.

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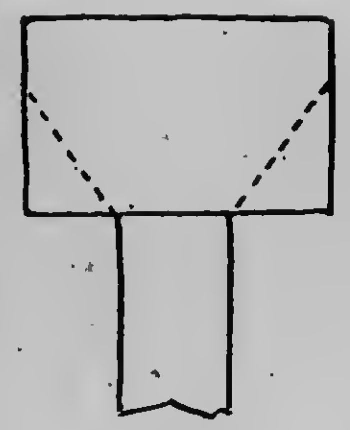

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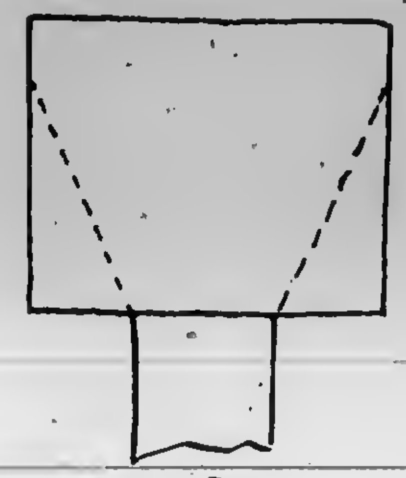

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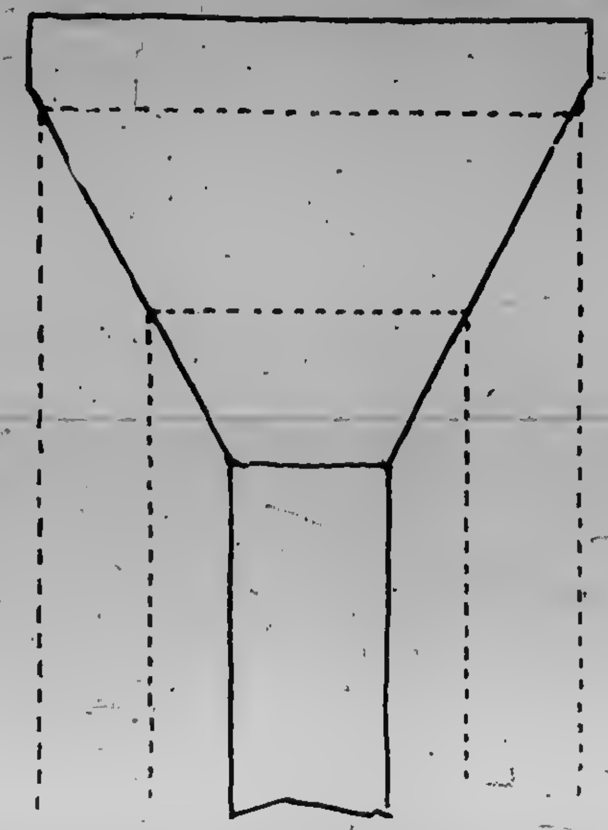

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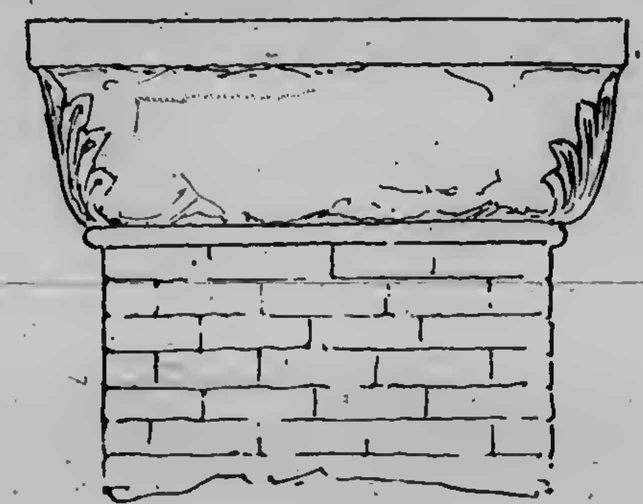

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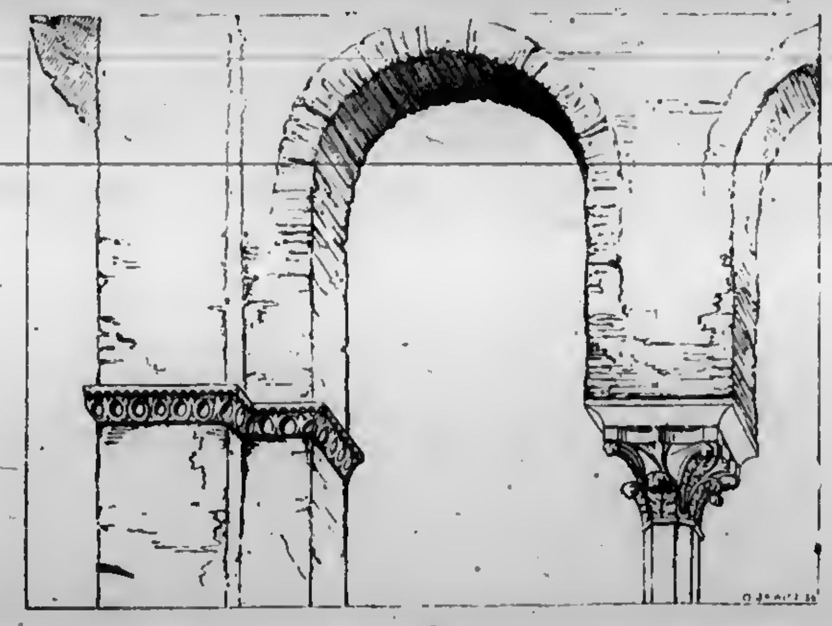

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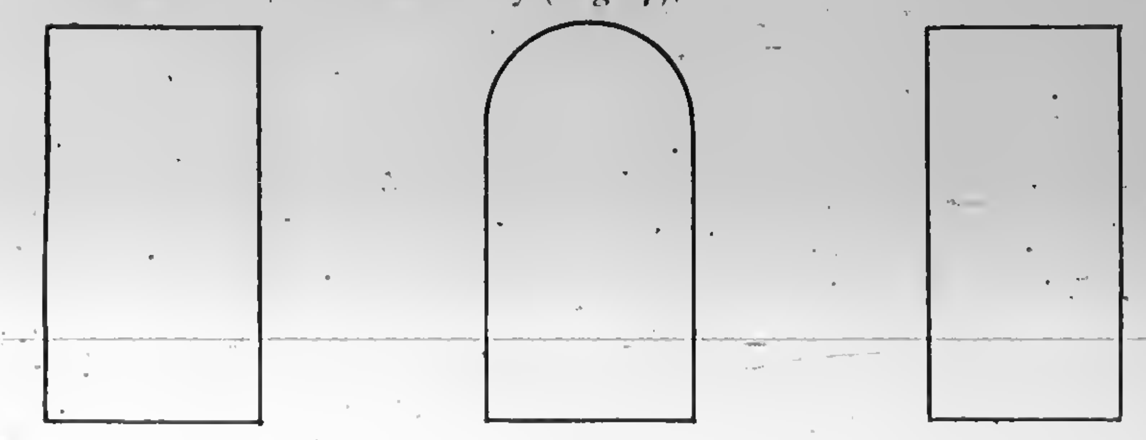
arch is used, is shown by the fact that a flat arch does sleep. The effect of repose is as great where a flat arch is used as if it had been a lintel.

Now I think we may say that in most building some effect of repose is necessary to satisfaction. To my mind the resulting effect of the most thoroughly Gothic cathedral is that of repose. The condition may be one of equilibrium only, but the equilibrium must be obvious in order to please the eye and then the resulting effect is repose.

It follows then that active looking arches cannot be inserted in a wall any how without upsetting the obviousness of this equilibrium. We do not want to have to reason about the stability of a wall but to see clearly at first glance that it is stable, and indeed an emphasis of stability gives more satisfaction. As a rule in masonry, what looks strong enough has an excess of strength, so that if we are to make arch work look right we must go beyond the mere consideration of statical needs, and give some consideration to artifices, by which the curved lines of the arch (which, as I said, seem to be the chief indicators of its restlessness) may be composed. One of these is uniformity in the springing line. This is a point which is often disregarded when the arches, though visible together, are not close together. When the openings form a regular arcade the need of making the arches spring from the same line is clear, but it does not seem to be so clear that there ought to be a springing line for each storey, just as definite as lines of strings and cornices which indicate the floor and ceiling levels. It is not a question of real stability, but one of repose gained by the composition of lines, and though ample piers may be between them, arched windows which spring from below the heads of square headed windows in the same storey (Fig. 7),



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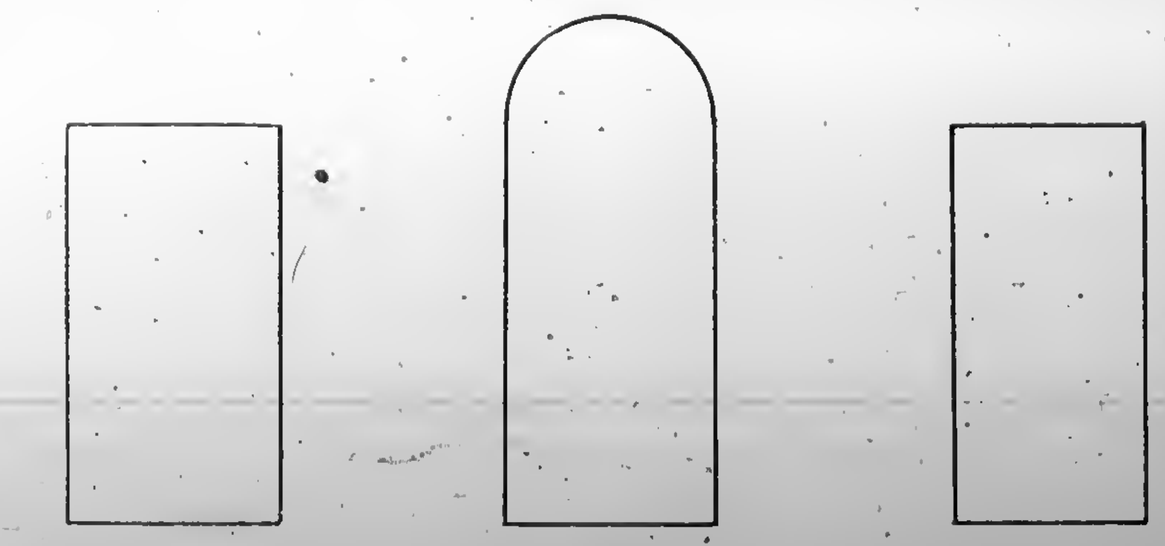

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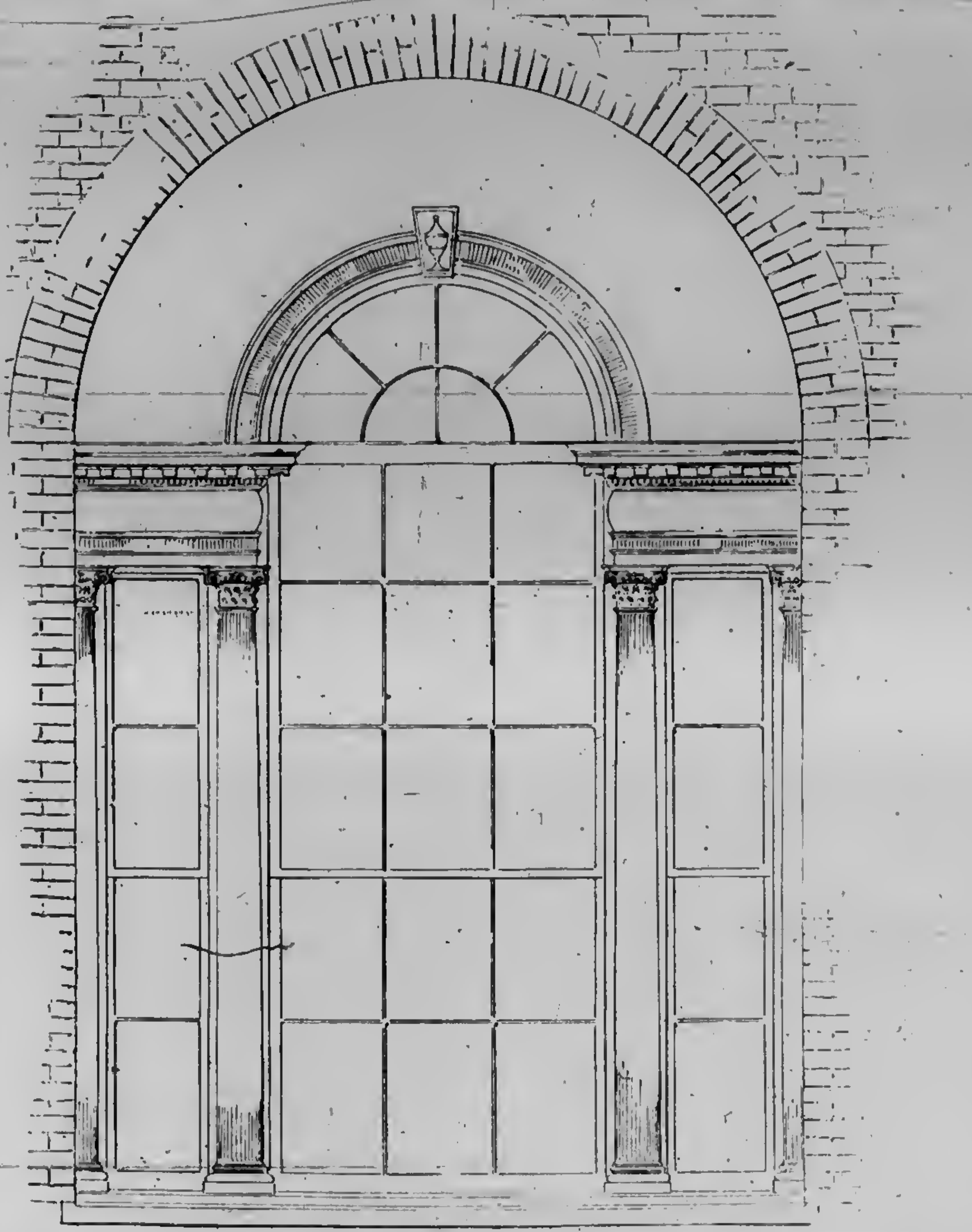
can never be as pleasing as those which spring from the level of these heads. (Fig. 8.)

It is as bad inside a room as without it, and the arrangement one often sees of a round headed window on the side of a drawing room towards the street, and square headed ones on another side, the square head on the same line as the Intrados of the round head, though



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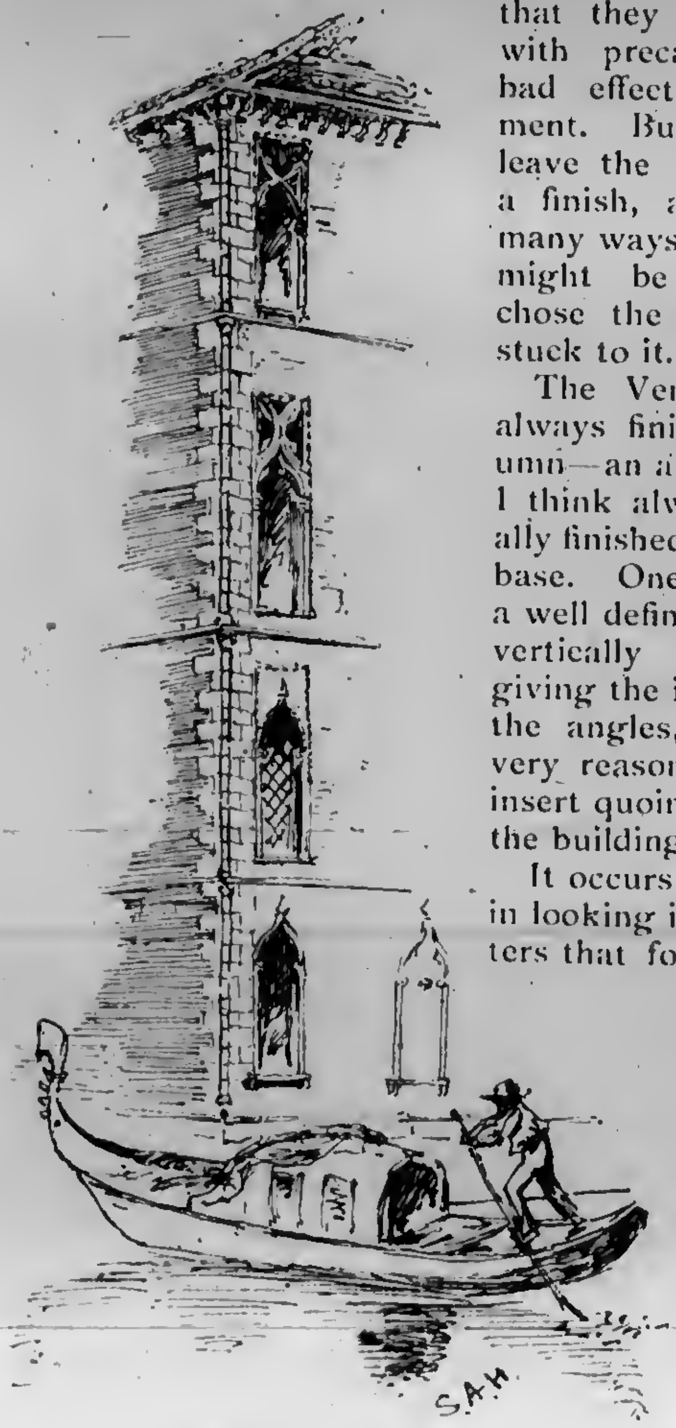
they are not often seen together from outside are always seen together inside, and the effect is unpleasing. The old colonial composition which we so often see is a good example of the right composition of square and round headed openings. (Fig. 9.) The moving line of the arch obtains rest by the intervention of the horizontal line emphasized by the cornice.

In this last we have an illustration of a habit of mind which ought to go hand in hand with the determination to avoid shams. The architect of shams has some kind of convenient construction covered up and masked with an appearance of some other kind of construction. The architect who likes to state the facts is too often content merely to state them, forgetting that a mere statement can hardly be called art. The difference between simple expression and artistic expression is that one lays the facts before us, leaving us to find out for ourselves what they are. The artist, poet, painter, architect, puts them in such a way that they strike at once without one's having the trouble to think at all. That is what makes the artist. He is not content until he has expressed the matter so that it will impress some one else.

There is a large stock of means to this end at the disposal of every architect. The whole list of mouldings, features and ornaments serve for this purpose. Some, as in the case of the base to which I alluded before, have

no other reason for their use. In fact there are many features of which one can say that the form in which they are presented is expressive rather than constructional. Of these are the whole family of vaulting shafts—free as well as attached. They are only mouldings in the stone pier which, as a matter of fact, loses a little of its substance to make them, or else, if free, are an ornamental addition to the piers which is sufficient without them. Nor can it be said that they represent the true line of pressure of the vaults; but to the eye they bring the weight of the roof down to the ground, and remove the appearance of a sideways thrust, which, if it caught the eye, would appear too great for the slender piers when the external buttressing cannot be seen.

Or to take an example that comes nearer home to us who see no vaulting, nor are ever likely to do any. A favourite feature in Venetian buildings is an angle column. They built in brick and reinforced their corners with deep quoins, their foundations being not so good that they could dispense with precautions against bad effects from settlement. But they did not leave the quoins without a finish, and of all the many ways in which they might be finished they chose the expressive and stuck to it.



VENETIAN SKETCH.

The Venetian angle is always finished by a column—an attached column I think always and usually finished with a cap and base. One gets not only a well defined angle, but a vertically defined angle giving the idea of props at the angles, which is the very reason for which we insert quoins deeper than the building courses.

It occurs at once to us in looking into these matters that for the majority of our buildings there is little opportunity of using features of this kind. We can usually afford only plain building. That is true to a certain extent, and a repugnance to decorating with architectural features simple buildings which ought to be plain is just as much the impulse of an artist as the desire to elaborate important work. But there are two things to be said on the other side.

In the first place much use of features is seldom a good thing, it is only in the exceptional building that much elaboration of ornament is in order. It it is expression we are aiming at we shall find, I think, that there is always something to express; not often much; and that in all cases minor things must be subordinated and the principal expression given to those which are important. It is just like any other work of art a picture, a story a judicious reticence about minor points is the safest way to give due emphasis to those which are important. So that it ought not to require many features to make good work.

In the second place there is no doubt that the man whose habit of mind tends to pure design is in the best position to do a good thing at small expense. I feel no inclination to criticize usage without taking a long second look at it. Usage has for the most part practical reasons for what it does, but I think one can safely say that it often adopts features that are not expressive and which are expensive; and the designer who is accustomed to straightforward thinking will be most likely to see his way to a better thing that will cost less.

There is also a class of features which seem to suggest an economy of material which would, if on any considerable scale, go far to make up for the expense of a more ornamental way of accomplishing the same construction.

As the line of thrust of a roof runs down a buttress to its outer limit near the ground, there is a portion of the lower part of the buttress which may be removed if only there is a prop inserted to hold the wall above. This fact has been made use of in churches to gain space for the central portion by making a passage through the inner side of the bottom of the buttresses. In this case the necessary columns may fairly be said to pay for themselves.

To return, however, from speculating upon the effect of studying principles to the principles themselves.

A very important factor in architectural design, for those who like it, is colour. The scientific discoveries respecting the nature of colour perceptions are so exact that one would be led to believe—and some persons have been led to believe, unfortunately for their work—that it would be possible to form sound scientific theories about the use of colour. Such appears, however, not to be the case.

The gist of the discoveries appears to be that colour is a sensation, like sound. People like harmonious combinations of colour without knowing that the harmony is caused by a relation between the undulations of light from them, which causes every fourth undulation from one colour to coincide with every fifth undulation from the other. Proportion of form is different. It is a matter in which the mind is concerned as well as the eye. Questions of material and construction enter in as well as the mere outline. Proportion cannot be said to affect the eye. One may look for hours at an ugly object and be able to turn at once to a beautiful vase and draw its outline correctly; but if one looks too long at a bright red object the next thing one looks at will be over-cast with the complementary of red.

From this reason—that colour is a sensation and independent of the reason—it probably comes that the eye is a safer guide than theory. But one may get general hints from nature. One is that though in nature masses of the same colour are the rule and are not monotonous, if we consider them, to see why, we see that the monotony is made up of incessant slight variations. We recognize the same charm in old buildings, where time and the weather have produced a variegation of tint in the stones or tiles. It only remains for us to take the hint and see that the pains usually taken by builders, and sometimes specified, to secure uniformity of tint in walling, are labour thrown away.

Ruskin enunciates the principle of indefiniteness of boundary to colour, deducing it from the example of parti-coloured animals, shells, etc. The examples in nature are certainly abundant, and one illustration of it in building is certainly successful—the patterns of black brick which one so often sees in old English brick buildings. These patterns have no regular beginning or ending, and are worked so consistently in this way that the cause must have been intention, rather than, as it seems to be, an irregular supply of the black brick.

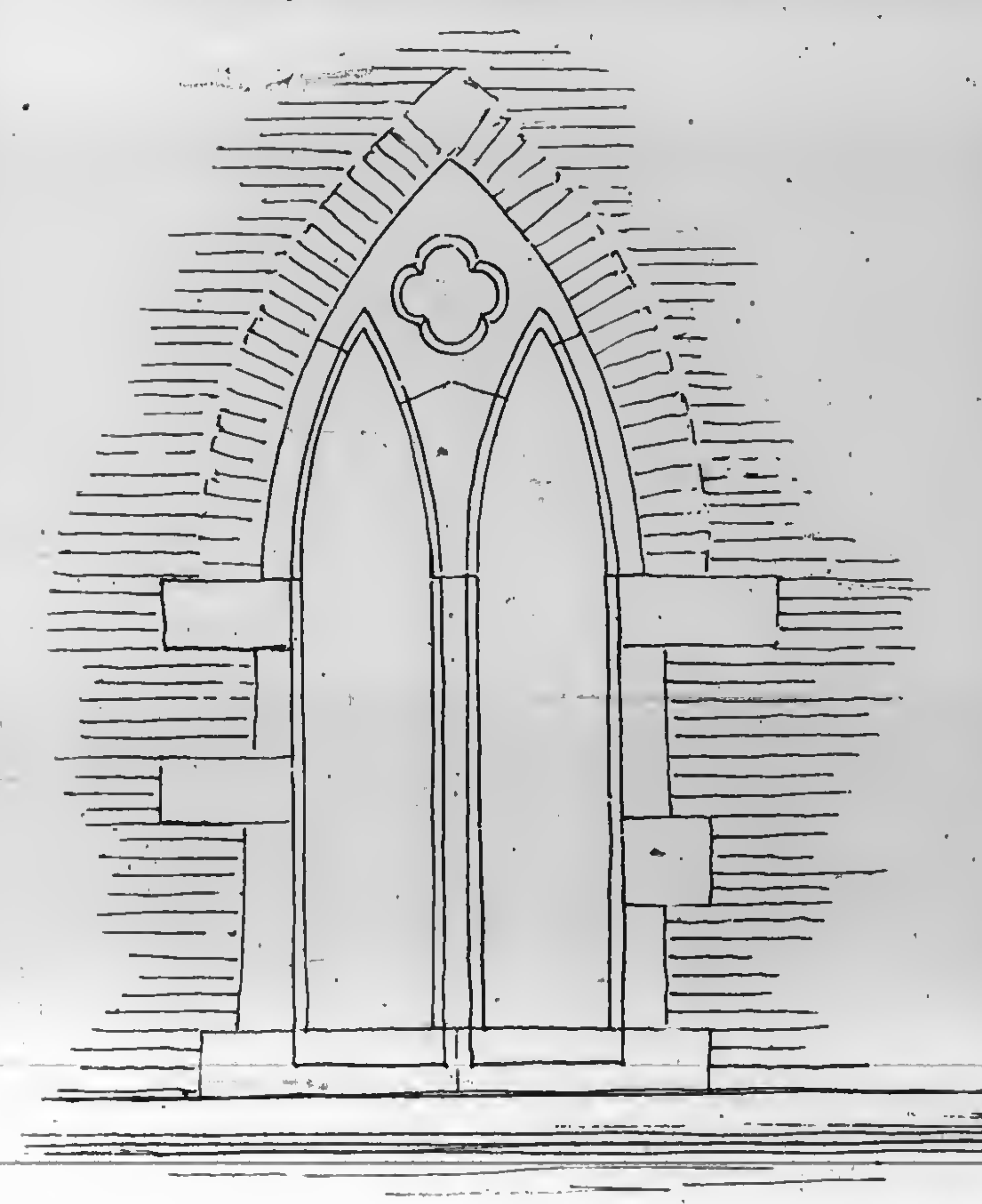
I have heard a proposal to abandon the use of a different-coloured stone for the jambs of doors and windows, as being too much definition in the boundaries of the coloured stone, and giving the idea that the jambs are not part of the wall. It is, however, so natural to use a different material for this purpose that it would be better to turn our attention to blending them with the wall, and this is obviously to be done by avoided regularity in the size and shape of the stones which form the jambs, and perhaps also in the voussoirs of the arches. (Fig. 10). This, as well as the irregularity of the brick pattern, is to be seen at Hampton Court. The irregularity of the stone would be considered extravagant if drawn.

The use of brick walling with bands of colored marble

is very common in Italy, and I remember being always especially pleased with the free way with which they abandon or take up the banding in the same wall. The tower of the town hall of Verona begins in bands of brick and marble, which is left off soon after it rises above the roof. In the church of S. Fermo, in the same town, the brick tower is even more capriciously and irregularly banded with white marble, and I remember being especially delighted with it, and thinking that it is not worth while to be anxious about a spotty effect from using stone for constructive convenience more in one part of a building than in another.

That is probably the safest lesson to draw from the success of colour combinations such as those which I have described as capricious. Whether they were intended to be capricious or not one cannot say, but I think it is not likely. It is not an effect which one gains by striving after. One can imagine an architect saying to his client or critic "I think I have succeeded in imparting some dignity to this front," but one cannot imagine his saying "Observe my capriciousness."

It is anxiety on either side that we should avoid. Nature seems to be careless how she splashes on colour, and we may consider ourselves exempted from petty



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anxieties in that direction. If constructive exigencies require stone in one part more than another, we need not be afraid of danger from want of uniformity of colour. Nor I think need we be afraid of colored trimmings or banding—provided we are not afraid of them and use them freely. There is plenty of example for it in old work, nor is it all irregular as in the examples I gave. I only cited those as illustrations of an extreme, which seem to prove the principle that colour should not be too definite in form. We cannot, of course, do anything like that in our own new work. If we go in for bands it is bands that must come out. It will not do, to stop them and have our client's friends asking him whether it was funds that did not hold out or the quarry—nor indeed is there anything the matter with the effect of bands. What we really want is a motive for a natural irregularity. One is to be found in the interruption of openings; whether we allow the banding to run through without any reference to the openings, and so interrupt the banding constantly, or whether we disturb the regularity of spacing in the bands by making some of them conform to the line of heads and sills.

But in the only Italian wall I remember studying there was another motive which answered perfectly. The marble bands were in all cases three courses of brick apart, but the bands themselves were of all thicknesses. Presumably with a view to economy of material and labour, the pieces were sorted so as to make courses of different heights with as little cutting as possible, and then laid at regular distances apart. There is a reasonableness about this which makes it satisfactory even when you discover it; and for persons who would not look for it nor discover it, I am sure it was none the less one of the contributing causes of the agreeableness of the wall.

DISCUSSION.

Mr. Dick said that one point that occurred to him in connection with this irregularity, the breaking of bands, etc., was as to the difficulty of drawing the line between an apparently natural irregularity and the affectation of it. They sometimes saw pieces of stone work in brick buildings without any natural termination as it were, in which the brick was run into the stone work. Sometimes the effect was very good, sometimes it was not. Where it was good it was successful, he thought, because the effect appeared to be natural, as in the case of the tower that Mr. Langton referred to; but where the effect was unsatisfactory it was, he thought, because it conveyed the impression to the mind that it was the result of a studied affectation of irregularity. It was rather a difficult thing to do successfully.

Mr. Darling said that it had always struck him that our modern buildings failed in comparison with the old ones just because those who were responsible for their construction were so particular generally in having everything exactly to correspond. With the old men nothing was regular. There were no two sides of a church the same. There were no two arches alike. That no doubt, contributed largely to the interest one felt in the building when seeing it, although one might not be conscious of the reason at the time. When they turned to new work the difference was apparent at once. He thought, however, that studied affectation was worse than perfect similarity. How the old men arrived at these results he did not know.

Mr. E. Burke, referring to a series of articles by Professor Goodyear on the features of some of the old basilicas said that that gentleman had for years been making measured surveys, in the course of which he had several times discovered a most remarkable irregularity in the spacing of the arches. But the irregularity was a gradual diminution in one direction and Professor Goodyear thought this was done with the idea of increasing the apparent length of the church.

A Member: This may be a gain from one standpoint but must be a loss from others.

Mr. Helliwell said that it occurred to him that the agreeable effects in these old buildings in Europe to which Mr. Langton had referred might be due to the action of natural causes. Time has a very softening effect on almost all materials, and will tone down what originally is discordant and in strong contrast. The architects of the present day had, of course, to deal with new buildings, and the colors that were introduced into them were often very harsh. Speaking of these bands of marble, he (Mr. Helliwell) had not himself had opportunity of seeing them, but he gathered that although when new it was of striking color, time had its effect on it as well as on other materials. They knew that in our buildings here in which they tried to introduce color the best effects were got where the greatest irregularity was observed, and where a great variety of shades was used too.

Mr. Darling said he was quite sure that those Italian buildings of red brick, black brick, and white marble built up together must have looked crude when first built.

The President remarked that he thought they had had an illustration of that in the building they had been looking at that day. While the smoke around the new city buildings was of course objectionable, it was beneficial to them from an artistic point of view in toning down the difference between the two different varieties of stones.

Mr. Darling: Speaking of that tower at Verona, do you not think there must have been a very violent contrast?

Mr. Langton said there was still a violent contrast,—but agreed that in buildings which had been scraped, as was sometimes done, there was a loss of colour and of harmony.

Mr. Helliwell asked Mr. Langton if in the buildings he had referred to he had noticed any difference as to color between the base and points higher up?

Mr. Langton replied that he had not.

Mr. Pearson said that the reason why the arch never sleeps was that it is continually exerting a thrust. It was not because there was no repose about an arch. He should imagine that there was as much repose about a curved line as about a straight line.

Mr. Langton said he might be entirely wrong in his statement of the principle, but it is true that an arch which has a different spring from the arch alongside of it is unpleasant to see, and he thought the principle was that the arch is a restless line, and must be composed with straight lines.

Mr. Darling: I think there is no question that you are right.

Mr. Gregg said he would like to get an expression of opinion on the use of white marble in buildings. In Ontario we have a great deal of marble, which was used, of course, for monuments, but not to any extent for buildings. In Toronto they seemed to avoid white marble—as a reminder of cemetries or for some other reason that he did not know of. Now, would white marble be a good thing to introduce into our buildings?

Mr. Darling said if the question were asked, should it be used generally, he would say no. He believed that if a man understood his work it was possible to use white marble quite satisfactorily.

Mr. Gregg: We hear of white marble being used in Italy.

A member: We have not the same climate.

Mr. Paull remarked that there was one building in Wellington street where white marble was used to some extent, but at a distance it gave one the idea of whitewash.

Mr. Belcher said that in the south of Ireland there were buildings in which white marble was used in combination with a reddish trap rock they had there, and the effect was marvellously beautiful. The marble was, however, distributed in such a way that it was toned down.

Mr. Gregg said that there was some marble found in Ontario that he believed could be combined and used with great effect in some sorts of buildings. Though they might not be suitable for the smoky parts of the city, he really believed that grand effects might be got by the use of some of our light marbles in suitable situations—effects which had never been attempted by the principal architects. He thought the subject was one worth investigating.

Mr. Dick said that a great deal of white marble was used in Philadelphia in connection with brick, both for window-sills and steps, and the effect was that of being clean and tidy but rather glaring. He thought that white marble always had a blank appearance, like that of a newly whitewashed house. The marble palace in New York which was built by the late A. T. Stewart was most unsatisfactory as regards the effect. It never looked as well as a sandstone building.

Mr. Belcher said that the white marble used in combination with limestone in the manner he had spoken of had not the glaring effect the white marble used as in Philadelphia was said to have. The stone with which it was used was nearly red, a purplish or bluish shade through it. In the way in which they had been combined there was nothing glaring or offensive in any way; on the contrary, the two stones blended most harmoniously.

Mr. Gregg said he certainly thought that some very bad use had been made of this material. For instance, in Chicago he had seen buildings that were veneered with white marble an inch thick. A person who does that would not produce a very handsome design; but he (Mr. Gregg) thought that for situations where there was no smoke or dirt to spoil the effect there was a chance, in the use of white marble, for the erection of very pleasing buildings.

Mr. Darling said he thought that if there was one material they ought to frown down the use of more than another it was pressed brick. He had never seen a building constructed of it that would not have looked many times better if common rough brick had been used. He thought that one of the charms of English and continental buildings was that the latter material was used in them.

Mr. Langton said that that was one of the things he had noticed. (The marble in the buildings he had referred to was not white, by the way, but yellowish). The brick which was used in combination with it was of the roughest kind. Speaking of pressed brick, once when he was ordering some common brick at the kiln the kiln-owner said that three years before, in order to compare with his own a brick from one of the pressed brick works, he had exposed a specimen of each brick on a fence. He showed him (Mr. Langton) a brick on the fence which he said was his own. It was as hard as ever it had been. The other, he said, he had to put under glass; and showed it inside the porch going all to pieces.

Mr. Darling repeated that he thought the architects of this country ought to set their faces against the use of pressed brick. They could not get a pretty wall out of it. The beauty of a wall constructed of the old brick was that when the sun struck it there were no two places in it that looked alike.

WORKS OF CONSTRUCTION.

A new Baptist church has been completed in New Glasgow, N. S., from the plans of Mr. H. H. Mott, St. John, N. B.

The new biscuit factory being erected in St. John, N. B., by the Queen Biscuit Co., is nearing completion, and will be ready for occupancy by the end of the month.

Mr. Kivas Tulley, C. E., has prepared plans of a scheme to connect the Toronto Island with the main land by means of a tunnel, instead of the proposed swing bridge. The crown of this tunnel will be eight feet below the level of the rock, and that portion of it lying immediately under the gap will be on the level. Those sections leading down from Bathurst street and up to the sandbar will be on a grade slightly steeper than five per cent. The tunnel will be lined throughout, and will be twenty feet in width, 16 feet in height, capable of carrying two lines of street cars. It is also suggested that a water main, with convenient manholes, be built below the floor of the tunnel.

A large opera house is to be erected in Ottawa, at a cost of $100,000, the contract for which has been given to Mr. E. E. Horn, of New York. The architects are Messrs. B. McElfatrick & Son, of New York, specialists in theatre building. The structure will have a frontage of 186 feet and will accommodate 1,500 persons. The stage will be 32 feet across, and the same in height. The drop curtain will be made of asbestos, so as to be fire proof, and the divisions between the theatre and the stage on each side of the drop curtain, clear out to the walls of the building, will be of solid brick and also fire proof. From front to rear the stage will be 34 feet 8 inches deep.

Extensive buildings have been erected at Niagara Falls, Ont., for the Niagara Falls Metal Works Company. The buildings are brick and stone, and were erected by Messrs. Newman Bros., of St. Catharines, who built and finished everything complete. There is a main building, two stories high, and 40 feet wide. The front is 120 ft., one wing 40 ft., and the other 120 ft., all floors 5¼ in. thick. There are six detached buildings, a boiler and engine building, a wood working building, for making wood hames and turning handles, a building for tinning and japanning, and one for storing steel, a malleable iron foundry, and a building for the annealing ovens.

A new addition to the School for the Blind, Halifax, N. S., has been completed. It is 72 by 46 feet, built of brick, with freestone finishings and granite foundation. On the main floor are the offices of the board of managers and superintendent, the male teachers' sitting room, three sitting rooms for boys of different ages and a commonplace band room. On the second floor are seven small dormitories, four larger ones and a lavatory. The basement contains the tuning and electric rooms, boys lavatories, laundry, checking room and furnace room. The entire building contains in all one hundred rooms. A beautiful corridor runs behind the main building and connects the east and west wings. The general contractor for the new wing was Mr. Samuel Marshall, and the sub-contractors as follows: Messrs. Harris & Son, carpenters; Longard Bros., plumbers, and Martin & Moore, painters and glaziers. The heating apparatus was supplied by MacDonald & Co.

BUILDING IN CANADA IN 1896.

REVIEW OF OPERATIONS IN MANY OF THE LEADING CENTRES.

To give our readers a fair idea of the extent to which building operations were carried on during the year 1896, a brief review of the principal centres will be found below. The conditions which prevailed throughout the year were not favorable to any great expansion in the building line, and taking the Dominion as a whole, it must be admitted that very little progress was made. In the two principal cities, Montreal and Toronto, there was very little money available for investment, and projects which early in the season seemed almost a certainty, failed to materialize when the expected time was reached. At other Ontario cities, on the contrary, there has been quite a revival in the building trades. The report from Ottawa is most favorable, and shows a large increase in the number of residences erected by persons for their private purposes. To a less extent this is also the case in London, Hamilton and Guelph. Winnipeg passed through an unusually quiet year, and in the cities of the Pacific coast province the season is regarded as only an average one. No improvement is reported from the maritime provinces. Brick has been largely used as a building material where wood was formerly employed, resulting in the erection of a better class of buildings. Prices of both material and labor were slightly lower than in 1895.

What conditions will prevail during 1897 is as yet regarded as somewhat uncertain. Architects have considerable work in prospect which may or may not be carried out, but it is earnestly hoped that the period of depression has been passed and that funds will now be forthcoming for long-projected undertakings.

MONTREAL, QUE.

The building trade in Montreal, in common with all other lines, has suffered from the financial depression, and the showing for the year 1896 is not one of entire satisfaction. There were erected several buildings of some prominence, but unfortunately for the profession of architecture in Canada, many of these were designed by American architects. Additions and alterations to existing buildings were an important factor, a fact which would seem to illustrate the desire of capitalists to obtain modern buildings with as little expenditure as possible. Building has been more prosperous in the suburbs of Montreal, particularly in Westmount, where several new structures of neat design were erected. Less of the speculative spirit entered into building operations in 1896 than for some years, and this is regarded as a source of congratulation, and will result in the erection of more substantial and properly-constructed buildings.

The proposed east end depot for the C. P. R., now in course of construction, and the Victoria College for Women in connection with McGill University, the latter of English architecture and built of limestone, were constructed from the plans of Mr. Bruce Price, of New York. The masonry contractors were P. Lyall & Son. The Canada Life building, corner St. James and St. Peter streets, built in Ohio sandstone, was also erected from the plans of an American architect, Mr. Waite, of Buffalo. Mr. P. Lyall also executed the masonry contract for this building, Mr. H. Beaumont being the sculptor.

Among the most important buildings designed by Montreal architects may be mentioned the following :—

The Montreal Diocesan Theological College, of English architecture, constructed in yellow sandstone and pressed brick, and English in character ; the chemical and mining buildings, McGill University, now in course of erection. These buildings were designed by Mr. A. T. Taylor, F. R. I. B. A., of Messrs. Taylor & Gordon.

The Bell Telephone Company's building, corner Notre Dame and St. John streets, and R. J. Tooke's building, St. Catherine street, are two of the many business blocks erected by Mr. Edward Maxwell. The former has its ground floor built in terra cotta, and the other stories of pressed brick. It is five stories high, and the whole crowned by a well-studied and artistic cornice of Renaissance style. The ground floor will be utilized by the Bank of Halifax, and the other stories laid out as offices. Mr. Peter Wand was the contractor for the terra cotta and pressed brick work. R. J. Tooke's block is a three-storey building of yellow sandstone. The contractor for the masonry was Mr. J. H. Hutchison.

The Ogilvy dry goods store is one of the most extensive establishments of the kind in the city. It is situated at the corner of St. Catherine and Mountain streets, built entirely of limestone and designed by Mr. David Ogilvy.

The Lachine Rapids Hydraulic & Land Co.'s power house, a brick and steel structure, was designed by Mr. W. McLea Walbank.

The Young Women's Christian Association building, corner of Dorchester and Stanley streets, has been entirely remodeled. A front of red sandstone was added, as well as an addition to the rear. The interior is specially designed and elegantly finished. Mr. A. C. Hutchison was the architect. Mr. Hutchison also built Messrs. Watson & Foster's wall paper factory and warehouse at Maisonneuve, and made additions to Dr. H. B. Yates' residence on Peel street.

Messrs. J. B. Resther & Son were the architects for Mr. J. M. Fortier's cigar factory on St. Maurice street ; they also erected two handsome cottages in Gothic style for Estate Masson.

Among the ecclesiastical and educational buildings erected during the year may be mentioned the St. Louis of France church, situated at the corner of Laval avenue and Roy street, and built of limestone. It is of Romanesque style, and was designed by Messrs. Roy & Gauthier. The convent of the Holy Cross on Mount Royal avenue is also of limestone, and was erected from the plans of Messrs. J. B. Resther & Son. Messrs. Brown, McVicar & Heriot were the architects for the Protestant School at St. Louis du Mile End. A public school at Westmount was constructed from the plans of Mr. Edward Maxwell.

The number of residential buildings erected was not large, principal among which is the residence of Mr. C. Faucher, corner of Dorchester and St. Matthew streets, built of limestone, of Romanesque architecture, and elaborately decorated. The inside is elegantly finished in Renaissance style. The plans were prepared by Mr. A. Raza, architect. Mr. Joseph Levy's house on Laval avenue is a fine residence in red and buff sandstone and pressed brick. Messrs. J. & H. C. Nelson, architects. Mr. Robert Findlay designed the residence of Mr. W. R. Miller, on Stanley street, built in sandstone and brick, of domestic Gothic architecture. The interior is finished in the old colonial style. The house of J. L. Morris, on Drummond street, is in French chateau style. Messrs. Wrighton & Morrison were the contractors for the masonry. Apartment houses have been erected on William street for Mr. H. B. Ames. These buildings were constructed after the design of Mr. Robert Findlay. Other residences were those for R. J. Pringle, H. Watson, C. Stevens and J. A. Prevost.

The prospects for the building trades in 1897 are considered better than a year ago. It is probable that some large commercial buildings will be erected, as architects have already been commissioned to prepare plans for considerable new work.

TORONTO, ONT.

The total number of building permits issued by the City Commissioner of Toronto last year is given as 410, having a total value of \$657,168, against a value of \$1,346,810 in 1895. These figures, however, cannot be taken as a fair comparison for the two years, inasmuch as the permits for 1895 contained \$550,000 for the buildings erected to replace those destroyed by the great fire of the winter of 1894, as well as \$130,000 for the Foresters' temple. The only work of signal importance executed last year was the large extension to the Foresters' temple on Bay street, which is down on the permit book for \$100,000. Below are the complete figures of permits granted :

BUILDING PERMITS GRANTED, 1896.

		Cost.
83	Brick dwellings	\$236,900.00
9	Brick-front and rough-cast dwellings	6,650.00
2	Frame dwellings, Island	1,500.00
186	Alterations to dwellings	55,695.00
10	Brick stores	20,400.00
38	Alterations to stores	67,823.00
4	Factories	42,000.00
13	Alterations and additions to factories	27,400.00
1	Warehouse	7,000.00
7	Alterations to warehouses	10,000.00
7	Office buildings	4,950.00
2	Schools	6,500.00
5	Additions to churches	4,540.00
4	Hotels	24,800.00
1	Addition to brewery	1,500.00
1	Addition to bank	1,500.00
2	Club buildings	10,500.00
1	Power house	5,000.00
1	Cold storage building	7,000.00
1	Dining hall	1,500.00
26	Stables	8,935.00
2	Additions to fire hall	4,500.00
1	Addition to Foresters' temple	100,000.00
3	Miscellaneous	575.00
410		\$657,168.00

A visit among the architects furnishes the information that the dwellings erected were of a substantial and modern character, the absence of speculative building so common in the days of the "boom" being a feature of the year. In church and school building the sum of \$11,000 represents the total expenditure, which is less than one-tenth the cost of such buildings in 1895. The few buildings erected in the city has necessarily restricted the amount of work secured by local architects. Many of them have, however, erected buildings at outside points, and in the particulars which follow some of these are referred to.

The addition to the Foresters' temple, above referred to, was erected by Mr. Geo. W. Gouinlock, architect, who has had charge of the entire structure. The contractors were Messrs. Oakley & Holmes, the Dominion Bridge Company supplying the structural iron and steel work. The building stands out somewhat unique, in that it is the highest building in the city. Mr. Gouinlock also remodelled a large residence on St. George street street for Mr. Geo. R. Warwick, erected conservatories, storehouse, etc., for the Steele-Briggs Seed Co., at a cost of \$15,000, and completed the Toronto Lithographing Company's building,

corner King and Bathurst street, cost \$25,300, besides executing several other commissions.

The Dental College on College street, erected from the plans of Mr. D. B. Dick, architect, was commenced in 1895 and completed last year. It is quite an important building of brick and stone, costing in the neighborhood of \$40,000. The contractors were : stone work, Jas. Crang ; carpentry, Wm. Simpson ; plastering, C. R. Rundle ; plumbing, Maguire & Co. ; tinsmithing, Douglas Bros. ; painting, R. J. Hovenden.

The principal factory building was that for the Cobban Manufacturing Co., on the Esplanade, executed from the plans of Mr. E. J. Lennox, who was also engaged during the year with the new city hall and court house.

Additions were made to the T. Eaton Company's warehouses, at a cost of \$25,000.

Among the buildings erected by Mr. Henry Simpson, architect, were a neat little factory and office on King street west for the Metallic Roofing Co., cost \$7,000. Contractors, James Crang, brickwork ; Young & Co., carpenters ; James Casey, painter ; Wheeler & Bain, tinsmithing ; Keith & Fitzsimmons, plumbing. Hotel for Jethro Worden, Adelaide street west, cost \$10,000 ; bricklayer, Robt. Robertson ; carpenter, Wm. Simpson ; plasterer, F. P. Lockwood ; plumbers and steamfitters, Purdy, Mansell & Mashinter. Mr. Simpson also erected a Presbyterian church at Hillsdale, cost \$5,000 ; Amos Train, of Flos, contractor.

Mr. G. W. King completed the town hall and fire station at Carleton Place, built of local stone, cost \$23,000 ; Mr. Rylan, of Smith's Falls, contractor ; also the Methodist church at London, cost \$35,000 ; Robert Robertson, bricklayer ; Coxhead & Co., carpenters, both of Toronto.

Messrs. Curry, Baker & Co.'s work was largely residential, among which the following are worthy of mention : Brick residence for E. F. B. Johnson, Q. C., on Spadina road, cost \$7,000 ; bricklayer, Jos. Yorke ; carpenter, G. B. Clements ; heating, Maguire & Co. Residence for Mr. Geo. Ross, Madison avenue, cost \$5,000, brick and cut stone ; masons, Davidge & Lunn ; carpenters, Baumhard & Co. ; heating, Maguire & Co. ; painting and decorating, J. W. Knott ; heated by Gurney "Oxford" apparatus. Same architects also had charge of the alterations to the Collegiate Institute on Harbord street, and a new wing to the General Hospital, Guelph.

The local work of Messrs. Burke & Horwood included remodelling the residence of Dr. J. B. How, alterations and new elevators in the Simpson building, cost \$10,000, alterations to the armory for the Cold Storage Company. The contractors for the latter were: mason, Cannon & Son ; carpenters, Moir & McCall ; iron work, St. Lawrence Foundry Co.; piling, Medlar & Arnot. Also improvements to the east wing of Osgoode Hall, the contractors being C. C. Witchall, mason ; J. C. Scott, carpenter ; W. J. Hynes, plasterer ; steamfitting and electric lighting, Keith & Fitzsimmons. Of the outside work Knox church, Woodstock, cost \$35,000, Mackintosh & Griffiths, contractors, and a residence at Sackville, N. B., for Prof. Hammond, are worthy of mention.

Two good residences in Rosedale for Messrs. A. E. Walker and H. H. Ardagh, cost \$5,000 each, were erected from the plans of Mr. J. Wilson Gray, who also finished another pair on Jamieson avenue for Messrs. J. H. Ford and Alex. Hay, at the same figure, and a \$3,000 house on Broadview avenue for Mr. David Selway.

Mr. C. J. Gibson was architect for a large four-storey warehouse on the Esplanade for the Toronto Knitting Works ; brick by day work ; R. Johnson, carpenter ; C. Davies, painter ; R. Rennie, roofer ; also for two residences in Rosedale, and one in Parkdale ; St. George's church, Lowville ; bank and business block, Gananoque ; St. Thomas' church at Bracebridge, and a residence in Orillia for Mr. W. B. Tisdale ; T. A. Ouderkirk, contractor for the last two works.

Messrs. Langley & Langley completed a residence in Rosedale for Mr. Jas. George, brick and stone, cost \$8,000 ; and two residences on Lumsley place for Mr. R. Elmsley, cost \$5,500 and \$6,500.

A modern residence was built in Rosedale for Mr. Hermann Simmers, the architects being Messrs. Gordon & Helliwell ; mason, W. J. Hill ; carpenter, Thos. Robinson. The same architects also erected a residence at Goderich for Dr. Holmes, and an Episcopal church at Woodlands, Man.

Among the principal works executed by Messrs. Strickland & Symons, architects, were : Additions to warehouses on Bay street for Geo. R. R. Cockburn, cost \$4,000 ; stable and driving house for the Verral Cab & Baggage Transfer Co., cost \$7,000 ; additions to residence of O. Macklem, Esq. ; additions to Bay street fire hall ; Methodist church, Grand Valley, cost \$8,000 ; additions to MacGowan & Kents' warehouse, Front street ; remodelling of National Club, cost \$15,000 ; remodelling and decorating residence of J. L. Morrison, Jarvis street ; pair houses, corner Bloor & Jarvis streets, for J. L. Morrison, cost \$16,000.

The Page departmental store on Yonge street was rebuilt by Messrs. Gregg & Gregg, architects. The alterations represent a value of \$15,000.

Mr. F. H. Herbert, architect, has contributed very largely during the past year to the domestic architecture of that largely built-up section situated north of Bloor street and known as "the annex." Among other work may be mentioned the residence on Madison avenue for W. Rein Wadsworth, Messrs. Dancy Bros., contractors ; detached residence, Bedford road, for Mrs. Annie Hill, Messrs. J. Bedford & Son, contractors ; both being works which reflect credit on our local builders. Other residences in this neighborhood finished during the year include a detached residence on Walmer road for Rev. Thos. Goldsmith ; a semi-detached on Spadina road for A. Nelson, and a detached on Huron street for Mr. Caleb Evans. R. C. Clute, Q. C., will soon be in possession of his residence and stable on Walmer road and Castle avenue, built by the same architect, who is also completing the residence immediately to the north of this estate for William Wellwood. The remodelling of the recently acquired property on Walmer road for B. Homes Dixon, and of the residence on Prince Arthur avenue for Æmilius Jarvis must also be included in the year's work. Mention might also be made of the recently finished bijou residence on Bloor street west, occupied and owned by T. A. Rowan, and that of his legal partner, Mr. J. L. Ross, who has under construction a new home on Lamport avenue, Rosedale. These are some of the buildings entrusted to the skill of Mr. Herbert, which, added to the many store and other buildings carried out under his supervision, make a good year's record. The coming season, we are also informed, will see the commencement of some more important works, and the present prospects are very encouraging.

OTTAWA, ONT.

The year 1896 was one of rapid progress in Ottawa, the number of residences erected and the character thereof going to show that the citizens have determined to provide homes for themselves. Altogether 318 new buildings and substantial alterations were completed, totalling in value about \$500,000. The residences were principally brick, brick-veneer, and frame.

Among the most important structures erected during the year were A. J. Stevens' brick block on Sparks street, cost \$14,000 ; Orme's brick block on Sparks street, cost \$18,000 ; three buildings on Sparks street for Currie & Slater, cost \$30,000 ; and W. H. Rowley's residence on Queen street, cost \$15,000. Early in December last, fire destroyed C. Ross & Co.'s large building on Sparks street, at a loss of \$225,000 ; Holbrook's building, loss \$55,000 ; and E. P. Hartney's building, loss \$25,000. Contracts were let during the month of January for replacing the burned structures, and this has brightened the outlook for 1897. Among the other new buildings projected are a large opera house to cost \$100,000, and an addition to the Protestant Hospital, contracts for which have just been given. It is also probable that a system of main drainage will be arranged for. Taken altogether, there is reason to anticipate a prosperous building season in Ottawa this year.

HAMILTON, ONT.

In Hamilton, according to the report of the Building Inspector, the number of building permits issued in 1896 was 214, having a total value of \$414,455, an increase of \$117,385 as compared with the previous year. Of the buildings erected 142 were brick and 16 frame, while there were 82 alterations to existing structures.

The principal building constructed during the year was the Ontario Collegiate Institute and Normal School, from plans prepared by William & Walter Stewart, architects. It is a three-storey building, 469 × 280 feet in size, to accommodate 1,000 scholars. The basement and first story is built in Credit Valley brown stone, and the interior finished in black birch and red pine, cost \$120,000. The contractors were : Brick and stonework, Geo. Webb ; carpenter work, Reid & Halliday ; plastering, James McKee ; electric work, Lowe & Farrell ; cast iron work, R. G. Olmstead ; slate boards, T. Irwin & Son ; galvanized iron, slate and tile work, Irwin & Son ; steel structural work, Hamilton Bridge Works ; steam heating, Fairley & Stewart ; plumbing, W. J. Walsh ; painting and glazing, K. J. Sculley. A large number of average-sized dwellings were erected, the work being pretty evenly divided among the different architects. The consrtuction of sewage interception works is now under way, and will cost, when completed, nearly \$100,000. Prices of materials have been higher than in 1895, and labor was also in better demand.

LONDON, ONT.

The permits issued for the city of London show a value of \$476,150, a slight increase over 1895. There has also been considerable building done for which permits were not taken out, and 20 per cent. could fairly be added to the above estimate. Brick has predominated. Residential buildings represent \$173,850, business \$73,300, and public \$229,000. In the latter is included the Grand Trunk car shops, which will cost, when completed, \$100,000. Geo. Mills, of Hamilton, is the contractor. The Hiscox office building, H. C. McBride, architect, cost \$40,000, and the Y. M. C. A. building, Moore & Henry, architects, cost \$25,000. The prospects for 1897 are looked upon as promising.

GUELPH, ONT.

Guelph has not fallen behind in the matter of building, as the total value of \$120,000 for the year 1896 would show. Some of the principal buildings were : New brick wing to General Hospital, 40 × 60 feet, three stories and mansard ; Curry, Baker & Co., architects ; contractors, plumbing, gasfitting and ventilating, Purdy, Mansell & Mashinter, Toronto ; stone and brick work, T. Irving ; carpenter work, Dominion Art Woodwork Co., Toronto Junction ; plastering, Hoidge & Son, Toronto ; painting, Moffatt Bros. ; tinsmithing, J. R. Jackson & Co. ; roofing, R. Rennie, Toronto. Estimated cost, \$20,000. Chemical laboratory to O. A. College, white brick, two stories and basement, 75 × 50 feet ; contractors, Mr. Matthews, brick ; Wideman & Clemens, carpentering ; Mahoney Bros., plastering ; J. S. Moffatt, painting ; J. R. Jackson & Co., tinsmithing ; Brown Bros., Brantford, slating ; College men, plumbing and heating ; Douglas Bros., Toronto, ventilation. Cost \$10,500. Two-story business block for McLean & McLean, 30 × 78 feet., pressed brick with white stone trimmings ; architect, John A. Trimble, Brampton ; contractors, T. Matthews, brick and stone work ; G. Steven, carpentering ; Mahoney Bros., plastering ; J. S. Moffatt, painting ; roofing, Brown Bros., Brantford ; Feek & Phillips, plumbing and heating ; Guelph Light & Power Co., lighting ; Goldie & McCullough,

vaults. Cost $7,000. Additions to Chalmers church, Langley & Langley, Toronto, architects; Geo. Steven, contractor. Addition to convent for Sisters of Loretto; two stories, stone, 41 x 71 ft., G. R. Bruce, architect; contractors, F. McQuillan, stone; John Hughes, carpenter work; Mahoney Bros., plastering; W. Scriven, painting; Geo. Howard, tinsmithing; Feek & Phillips, plumbing. Cost, $5,000. Stone addition to store of Frank Dowler Co.; contractors, T. Irving, D. Young, A. Cormie, and Burr Bros. Cost, $5,000.

B. Klœper's residence is one of the finest in the city. It is two-and-a-half stories, pressed brick, 33 x 56 ft. Architect, G. R. Bruce; contractors, H. Chubb, brick; F. W. Darby, carpenter; Mahoney Bros., plastering; J. Goss, painting; J. R. Jackson & Co., tinsmithing; Feek & Phillips, plumbing. Cost, $4,000. A double semi-detached pressed brick residence was also built for John Hutton. Architect, G. R. Bruce; contractors, H. Benallick, John Hughes, Mahoney Bros., A. Cormie, D. E. Rudd, Feek & Phillips. Cost, $4,000.

QUEBEC, QUE.

While in 1894 building in Quebec reached in value $500,000, and in 1895 only $350,000, the year just passed shows a still further reduction, the figures being given as a quarter of a million dollars. In the 1895 estimate, however, was included the new city hall, so that the comparison is more favorable than would appear at first glance. Residential buildings account for about two-thirds of the amount, and business establishments and churches for the balance. There has been some activity in building in the towns adjacent to Quebec, particularly in churches, in which over $200,000 has been spent. The buildings were constructed about one-half each of brick and stone. The creation of a new park, with a conservatory, etc., cost in the vicinity of $30,000. Among the principal contractors were Jos. Gosselin, Jos. St. Hilaire, L. Moisau, Hubert Morin, Edward Matte, Caliste Dion, Olivier Michaud and Jos. Moageon.

ST. JOHN, N. B.

The permits issued by the Building Inspector of St. John last year were 78, against 82 the previous year. The total value was $154,940, against $187,625 in 1895. The High School building was the principal structure, and cost $40,000. The architect was G. E. Fairweather, the masonry contractor B. Mooney & Sons, and the carpenter John Duffy. The Pender nail factory, the Murphy carriage factory and the Thorne warehouse were other important business premises. The dwellings were constructed principally of wood. The contract has been let to R. D. Boss for a biscuit factory, 92 x 47 feet, with brick boiler house. Very little change occurred in the prices of materials or labor. The average wages for masons was $3 per day, and for carpenters $10 per week.

HALIFAX, N. S.

While, perhaps, there were fewer buildings erected in Halifax in 1896 than during the previous year, they have been of a better class, and the total expediture is greater, being about $700,000, or an increase of $100,000. The details are: Residential, 100—brick 2, wood 98; business, 23—brick 7, wood 14; public 8—wood 1, stone 4, brick 3. The drill shed, commenced in 1895, was completed last year, and cost $200,000; J. E. Askwith, contractor. Other prominent buildings are those of Gordon & Keith and Geo. Wright on Barrington street, the immigration buildings at deep water terminus, the new Gerrish engine house, and Barnstead & Sutherland's building on Barrington street. The principal residences were those of Senator David McKeen, cost $30,000, and Mr. Payzant, cost $10,000. The architects for the different buildings were J. C. Dumaresq, Elliott & Hopson, Henry Busch and W. T. Whiteway. Some of the contractors were Messrs. Askwith, S. M. Brookfield, McArthur, Marshall, Curry Bros. & Bent and Rhodes, Curry & Company.

WINNIPEG, MAN.

Winnipeg has just passed through what is to be hoped its final period of depression, for its showing last season in the building trades, outside of road-making, is lower than ever, hardly reaching the $450,000 mark.

A goodly portion of the business done during 1896 has been "cobbling," that is, alterations, repairs and stone foundations to buildings erected during the boom years. However, there is every reason to expect an improved state of things in 1897, when once more the Hub City of the Dominion will again be able to hold her own in building matters with any city in Canada of a similar size. Mining operations on the east shore of Lake Winnipeg will, it is believed, stimulate building operations.

The largest contracts were the Assiniboine Block alterations and additions, which cost $35,000; Chas. H. Wheeler, architect; John Shaw & Co., builders. The sum of $30,000 was spent on the exhibition buildings; Mr. Burgess, architect; Kelly & Co., Andrews, Robinson, Thompson & Co., Murray & McLeod, and others, being the contractors. The new telephone building, Kelly & Co., contractors, cost about $18,000. The Wyatt block, constructed by Thil. Burnett, cost $16,000. Then there were new residences built for Messrs. Wm. Blackwood, cost $8,000; W. H. Culver, cost $11,000, and W. Tupper, which are referred to in a correspondence below. Mr. Griffith, architect, erected several residences, as well as Mitchell's photograph building and Ryan's new block. The Dufferin and Argyle schools were completed in 1896, C. H. Wheeler being the architect, and Kelly Bros. and John Shaw & Co. the builders. The Gurney Co. erected a new warehouse at a cost of $17,000; Kelly & Co., contractors.

C. H. Wheeler designed new residences for D. Lennons and John Plaxton, the contractors being J. C. Gilker and S. B. Ritchie respectively; also a warehouse for R. R. Taylor, P. Burnett, contractor. Mr. Greenfield erected several residences, as well as alterations. The price of brick and wood has been about the same as in 1895, but stone has advanced about 5 per cent.

There is one important matter which should receive the attention of the contractors in Winnipeg, and that is the low prices for which work has been taken during 1896. There is scarcely a builder in the city who has more than held his own in figuring on contracts, the competition being so lively and keen as to cause considerable cutting; the result being either loss or "as you were before." No profit in contracting was the catch word in the trades last season. This "cutting" process makes it very difficult for architects, especially at the commencement of a season, to estimate the cost of new buildings. Scarcity of work as a rule means low prices; an abundance, high prices.

A correspondent sends us the following communication relating to building operations in Winnipeg:

While the year 1896 has not been one of great activity in the building line in Winnipeg or the province, yet there has been a general advance along the line, especially in the erection of stone foundations under and modern improvements in buildings erected during and since the now historical "boom," by persons whose chief object was to build to sell, or mortgage to such an extent that they might drop out with profit to themselves and let the loan company take possession. Most of the improvements to the old buildings are not being made from philanthropic motives, but are prompted by a desire to protect the interests of the owners, who realize that we are becoming a fastidious people, and now insist on enjoying the conveniences and comforts enjoyed by our sisters, cousins and aunts in the eastern cities. When a house has not these conveniences, the inevitable notice, "To Let—Rent Low to a Desirable Tenant," is to be seen, week in and week out, in the window or on the door post.

Many frame and brick residences have been erected, principally in the south-western and western portions of the city, all on stone foundations, with basement full size of house, properly sewered. The old method of erecting a frame or brick building on a wood sill, supported by plank set on the sod, has been abandoned. It was found that a foundation formed in this manner decayed in six to ten years, which naturally seriously affected the stability and value of the superstructure, as well as making it very difficult to heat during the cold snaps that occasionally visit Manitoba.

It is only a year or two since the majority of dwellings here were entirely frame, a few frame and brick veneer, and an odd one here and there of solid brick. Now a brick veneer house is an exception, and the number of solid brick dwellings is increasing every year.

The construction of sewers and a waterworks system during the past few years, combined with the efforts of the loan companies, which now loan only on buildings constructed according to modern ideas, the amount advanced and the interest charged, has been the means of improving the character of the buildings constructed, as well as the character of the builder, so it may be said, "Virtue is its own reward," and has also the advantage of being able to secure a large loan at the lowest rate of interest.

Mr. W. H. Culver, Q. C., has had erected a very fine residence on Edmonton street. The exterior walls from grade line to window sills and lintels are of Calgary sandstone. The exterior walls of the superstructure are local buff brick, the principal apartments of ground floor being finished in oak and the windows glazed with plate glass. Cost over $11,000.

Mr. William Blackwood has also had erected a large residence on Colony street, stone foundation above grade line, faced with random coursed Stonewall stone, the exterior walls above being local buff brick. The principal apartments are trimmed with oak, remainder with British Columbia fir, with doors framed with cedar panels and B. C. spruce stiles. Cost about $8,000. Mr. George Browne was architect of both the above houses.

Another fine residence has been erected for Mr. W. J. Tupper at Armstrong's Point, from plans prepared by Mr. Walter Chesterton, architect. The foundation above ground line is faced with random coursed local limestone, and the exterior walls above are red pressed brick, with the gables in the half-timbered style. S. B. Ritchie was the contractor.

These three are the principal residences erected last year. The others, although good of their kind, are of the ordinary design.

Two or three business blocks have been erected on Main street. The principal one, erected by Messrs. Wyatt & McDonald, near the Bank of Montreal, is a good solid brick building of two stores, three stories in height, and treated in a plain manner, evidently with the intention of receiving maximum of revenue for minimum of expenditure, regardless of the wish of the citizens to have the principal retail street of the city lined with edifices of an ornamental character. The large plate glass windows have a fine effect, especially at night, when all ablaze with light. But the same mistake is repeated here that has been made in most of our shops, viz., the window reveal is too deep and the square iron pillars which carry the front wall are so large and so placed that they cut off a proper view of the goods in the windows. It is strange that this objectionable method of constructing show windows, and which is obsolete in up-to-date eastern towns, should still be followed, particularly in a city of progressive ideas such as this is.

A commercial building of some importance and which is sure to become a factor in the prosperity of the country, and known as the Parsons cold storage warehouse, was commenced last year and completed this. It is built at the river bank, next the transfer railway, and is a well-constructed substantial building, stone foundation and brick superstructure, three stories and basement in height, planned after the latest and most improved system by a Chicago architect who makes a specialty of cold storage warehouses; cost $20,000. Mr. S. Frank Peters, architect, superintended the work.

The only church work of any importance executed this year was the addition and improvements to the Roman Catholic Church of St. Mary, admirably located in a thickly-settled portion of the Hudson's Bay Co.'s reserve. The edifice was considerably increased in size by extending it in front almost to the street line, and its appearance was improved by a new stone and brick front, with granite columns at each side of the entrances. The south-east corner is flanked by a square tower of bold design topped out with a spire, and the south-west corner by a circular tower. The church being in the Norman style, the spire does not seem to harmonize with the rest of the building, and if the spire had been omitted and the roof of the tower carried up to a greater height than at present, the effect would be much better. Cost about $18,000. Mr. S. Hooper, architect of the improvements.

One or two office buildings are promised us for next year. Plans of one, I understand, have been prepared by Mr. George W. Gouinlock, architect, of Toronto, and, therefore, we may expect that it will be an ornament to the city, and a credit to the designer. A first-class office building would fill a long-felt want, and without doubt yield a good return on the investment.

In the early part of the summer a number of leading citizens formed themselves into a committee of ways and means for the erection of an opera house, and decided to give a bonus of $10,000 to any one who would erect and equip an opera house in an approved location, size and style. The result was that opera house builders became as thick as mosquitoes in a Manitoba swamp in summer time and just as hungry, with as little to fall back upon. The committee became bewildered at the number of "dainty dishes" set before them, each dish being recommended by its friends as being the only original and long-desired article. After many meetings and much discussion the committee seemed to dissolve into space, and the new opera house is numbered among the things that might have been and yet may be.

VICTORIA, B. C.

The sum of $500,000 will cover the cost of buildings erected in Victoria, this being about the same as in 1895. On the new parliament buildings $125,000 was expended, and on the post office $75,000. The other principal buildings were the Bank of Montreal, a four-story stone building, cost $40,000; F. M. Rattenbury, architect; McGregor & Jeeves, contractors; additions to St. Joseph's hospital, 4 stories, cost $25,000; S. Maclure, architect; brick warehouse for S. Leiser & Co., three stories, cost $20,000; A. Ewart, architect; Humber & Sons, contractors; brick warehouse for James Yates, three stories and basement, cost $15,000; C. Ewart, architect; Thos. Catteral, contractor. Several good dwellings were erected at a cost ranging from $2,000 to $3,500. The materials used were largely brick and stone, which were lower in price than in 1895.

Mr. Thos. C. Sorby has submitted a comprehensive scheme to the City Council for the improvement of the harbor, which, if carried out, will not only prove a boon to the city, but will provide employment for a large number of workmen.

NEW WESTMINSTER, B. C.

Considering the present period of depression, some advance was made in New Westminster, and indications are not wanting that 1897 will see still further improvement in the building line. The large armory and drill shed was completed early in the year, at a cost of $7,000. The Roman Catholic seminary, corner of Third avenue and Seventh street, is another important structure, costing in the neighborhood of $10,000. Nelson's brewery at Sapperton has been completed at a similar cost. The city market has accounted for an expenditure of $6,000. A number of substantial residences were built during the year, chiefly those of Messrs. Jas. Kennedy, W. Myers Gray and Geo. Calbick. The buildings and wharf of the Automatic Can Company will cost, when completed, fully $100,000.

STRATFORD, ONT.

The sum of $85,000 represents the building improvements in Stratford. Repair work and residences have predominated, but, notwithstanding, a few other buildings of some merit were erected. Among the list are: House of Refuge, cost $16,000, H. J. Powell, architect, W. Clark, Toronto, contractor; Catholic Hall Association, alterations, cost $15,000, D. G. Baxter, architect, W. Daly, contractor; two kindergarten schools, D. G. Baxter, architect, J. Becker, contractor; brick residence for R. T. Orr, cost $4,000, Thomas Orr & Sons, contractors; improvements to Albion Hotel, cost $4,000; stable and residence for D. M. Fraser, cost $3,000, H. J. Powell, architect, J. L. Youngs, James Stamp and William Daly, contractors; residences for A. J. McPherson, cost $4,000, H. J. Powell, architect, Weber & Litt, A. Oswald and Porteous & McLegan, contractors. Considerable work was also carried out in the neighboring towns by Stratford architects. The St. Mary's Methodist church, built by Mr. Baxter, cost $14,000, J. Near, contractor. Prices of materials were generally lower, particularly of brick. The erection of several buildings as soon as spring opens is said to be in contemplation, and if the work holds out the coming season is likely to be rather active.

BRANTFORD, ONT.

The value of buildings erected in Brantford in 1896 is given as $125,000, and is regarded as a fair showing. A large portion of the buildings erected were for residential purposes. The principal work was carried out from the plans of Hewitt & MacLaren and A. H. Mellish, architects.

ST. CATHARINES, ONT.

The sum of $62,000 as the total value of building in St. Catharines shows a large increase as compared with the previous year. Of this $28,000 was residential, $20,000 business, $11,000 public and $3,000 sundries. Newman Bros.' store cost $3,500; McSloy's residence, $7,500; stone addition to knife works, $6,000; addition to Welland Vale tool works, $6,000; rebuilding opera house, $5,000; general hospital addition, $4,000; two double tenement houses, $6,400. The architects were Messrs. Wm. B. Allen and S. G. Dolson, and the contractors Messrs. Geo. Wilson, Newman Bros., W. H. Drysdale, Ed. Hudson, John W. Carl, Jas. McBride, E. Stapleford, E. C. Nicholson and others.

CHATHAM, ONT.

Some improvement is reported in building operations from Chatham, the sum expended being $74,500. Two schools were erected at a cost of $33,000, and residences to the value of $37,500, besides one hotel costing $4,000. Brick is represented by $55,000 and wood by about $20,000. C. R. Oldershaw was architect for one of the schools, the hotel, a terrace of twelve houses, and several residences. The contractors were J. Darling, Robertson & McKie and William Blight. Materials have been lower in price.

CHARLOTTETOWN, P. E. I.

In Charlottetown, P. E. I., fifteen residences, two business places and one public building were erected, at an approximate cost of $100,000. In this is included the Roman Catholic cathedral, of stone, erected from plans of F. X. Berlinquet, Quebec, by Paquet & Godbout, of St. Hyacinthe, Que., at a cost of $60,000. The only other building of any note is a brick store block on Grafton street, cost $12,500. C. B. Chappell was the architect and Parkman & Crabbe the contractors. There is very little work in view for 1897.

OTHER TOWNS.

Reports from a number of other towns are not of a very encouraging character. In Barrie $75,000 was spent on buildings, $15,000 on streets and cement sidewalks, and $4,000 on sewers. There were erected 9 residential buildings, 4 public and 1 business, all brick, principal among which were the public school, Methodist church, theatre, and agricultural buildings. Architects, Smith & Bird and Thos. Kennedy & Co. In St. Thomas the principal buildings were the Jackson & Brierly block, cost $6,000, and the Disciples' college, cost $4,000. Architects, J. Z. Long & Son. Contractors, Wm. Reath and H. Lindop. A few substantial buildings were erected in Collingwood at a cost of about $20,000, but as a rule architects were not employed to prepare plans. Some $12,000 was expended on cement sidewalks. It is reported that a number of new buildings are contemplated this year. Twenty-five new residences were erected at Fort William, besides other business places, and a large $10,000 block is to be commenced as soon as spring opens. Buildings were erected in Berlin to the value of $189,770; Rat Portage, $100,000, in which is included the Cowan block, $8,000, and the Lauren block, $6,000; Preston, $20,000; Smith's Falls, $40,000; Listowel, $15,000, including Anglican church, cost $8,000, Frank Darling, Toronto, architect, W. E. Binning, superintendent, and residences for Mrs. W. G. Way and Mr. F. W. Way, cost $2,000 and $2,500 respectively, Bamford Bros., contractors; Newmarket, $18,000, including 3 residences, 2 blocks of stores and 1 public building, built of brick and wood, Wm. Bunney, architect for most of the buildings; Sarnia, $25,000, included in which is the county poor house, $18,000, H. G. Phillips, architect. The general hospital, which cost $25,000, was completed last summer, J. C. Robertson, architect. Prices for labor have been somewhat lower, owing to little demand. Calgary, N. W. T., spent $50,000, the most important building being the Indian industrial school, a stone structure costing $15,000, built with the object of adding thereto, Child & Wilson, architects; Brandon, Man., $25,000, two-thirds brick, balance wood, W. H. Shillinglaw, architect.

CHIPS.

Robert Robinson, contractor, Toronto, who died last month, left an estate valued at $12,770.

The Ontario Radiator Manufacturing Company, of Toronto, are reported to have secured premises in the northern part of the city and will shortly commence operations.

The corporation of the City of Toronto is applying for legislation to compel owners and other persons interested in buildings, other than private dwellings, more than two stories in height, to provide proper fire escapes thereon, and to prevent the occupation of such buildings unless such fire escapes are provided.

An interesting exhibition of views of English ecclesiastical architecture was given at the School of Practical Science last month by Mr. Jos. Keele, fellow in the Department of Architecture. Mr. Keele took great pains in explaining the technicalities of the buildings, the photographs of which were taken by himself.

Professor Capper delivered an interesting lecture at McGill University recently on "Christian Architecture." He began by showing that its beginnings showed a decided backward movement in point of construction from Pyzantine and Roman architecture. The characteristics of the Christian basilicas, as distinguished, in the lecturer's opinion, from the Pagan were explained and several examples thrown on the screen. The division into apse, transept, nave and atrium was illustrated by numerous plans and views, and attention was also drawn to the practice of raising the altar end of the church. Architecturally the earlier Italian churches came in for rather severe condemnation, and there were some very interesting criticisms of the Cathedral at Pisa, with its leaning tower, or campanile. The influence of the Pisan front on neighboring churches was shown by some interesting views.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Quarried Stone. A CONSIDERATION in the use of stone for important buildings is that of having it quarried, stored and seasoned some time before being worked and placed in the walls. By these means the natural sap is allowed to evaporate and the stone tested as to its quality. This would add slightly to the cost, but the money would be well spent if this precaution prevented the wasting of stones from the rains, frosts, or atmospheric influence, which, especially in this country, soon act on the surface of a newly-quarried stone. Stone that is quarried one day, and built in the wall the next, is in a "green" state and unfit for use. It is not in condition, as its pores are open and ready to absorb moisture or destroying gases, which would tend to its early destruction. Every stoneworker knows that the polished surface on a stone that has been seasoned is very different from what he gets on one fresh from the quarry; and this of itself should be sufficient evidence to warrant the precaution recommended, which is, to thoroughly season stone before using.

Piece-Work vs. Day-Work. IT has never yet been satisfactorily decided whether it is better to have work done by the day on buildings, or by piece-work. It is quite natural for men who are receiving a certain definite price for a piece of work, and when the price has been cut down to the smallest limits, to put the least amount of labor upon it which will make it acceptable. We may deplore or condemn this disposition as much as we choose, but that will not help the matter, because it is founded in human nature. Men do not, as a rule, work for the sake of work. Labor is not in itself desirable; it is the results or the products of labor which we desire, and which constitute the sole natural incentive to labor. This universal and inherent disposition of mankind to supply their wants with the least possible exertion, which is in itself right, and to which we are indebted for all our progress and improvements, is the prime cause of all slighted piece-work. But some builders leave it to their customers to discover this before the work is accepted from the workman, while others have men as overseers whose special business it is to find out the faults before the work is passed; and herein lies the whole secret of the success or failure of piece-work. Payment by the piece is, perhaps, the fairest way to have work done if everything is honestly and properly done on both sides, because each workman is then most likely to be paid in exact proportion to his ability; but it is all-important that there should be some definite standard of workmanship which the finished work must conform to, and it is equally important that an honest judge should see that that standard is maintained and uniformly adhered to. The disposition of workmen to slight piece-work, and do it in the poorest possible manner so long as it is accepted, is supposed by many to be fatal to the production of the highest grade of work. And yet it is a notorious fact that much of the best work done in this country and the neighboring Republic is paid for entirely by the piece, and the men doing the work find little to say against the system. Notwithstanding all this, conditions will arise in and about a new building, for which no provisions have been made, nor could be made, that seem to point out that it would have been better to have had the work done by the day. If all men were honest and trustworthy, work by the day would be the proper thing; then the owner would receive full value for his outlay, and the workman would receive a just remuneration for his labor and his skill. Doubtless, Providence intended that all work should be done by the day, but the perverseness and selfishness of mankind have so ordered matters that an honest day's work can only be obtained under fear of the lash. Hence the failure of the day-work system.

Building Brick Piers. THE reason why so many brick piers give out or prove unsatisfactory is not because of their containing enough brick, but because of their not being properly constructed. The only way to build a good and substantial pier of brick is to lay each course the full size of the pier, and not, as is often done by careless workmen, to build up the outer four inches of the pier seven or eight inches high and afterwards fill in the interior, as it is impossible to get proper bed or bond; bricks of the hardest quality only should be used when heavy weights have to be sustained. Avoid bats and use as little mortar as is necessary to get solid work. Make the size of piers so that whole bricks can be used to obtain proper bond; tamp each brick after it is laid in position with a hammer until it rests solid on its bed. In small piers lay the brick on a bed of mortar and flush up solidly every course; in larger piers make a joint or rub on the bed and lay headers every fourth course. If bnod stones are to be inserted, the joints should not be too tight; the larger the pier the larger the joint and bedded high in the centre, and in no case should a bonding stone be bedded on the outer edges of the pier only, as it would then be likely to crack and crumble with the weight it carried. Use cement in all mortar in connection with lime, and wet the bricks in all cases where there is not any danger from frost; when iron plates or columns are set on the bonding stones, and the plate should very nearly cover the whole stone when possible.

Ornamental Work. WHEN a contractor estimates on the cost of carving and other ornamental work, when in stone or in wood, he often runs considerable risk, unless there is a plentiful supply of large scale details to form the basis of his estimate, or unless he is thoroughly familiar with the style in which the architect is in the habit of having his work carried out. In an open competition, where the lowest tender is to be accepted, there is little doubt that the differences between estimates are often largely due to vague drawings or the absence of provisional sums for the ornamental work in the specifications. Marginal sketches in the specifications are great aids to the estimator, and ought to be made more use of than they are—especially in these days of rapid work, when it often happens that there is not time to draw many details before the contract is signed. Contractors should not be asked to spend too much time in figuring on a job they may not get, and to aid them the architect should make everything as plain and as easily understood as possible. An inexperienced man who secures a contract in a competition may well doubt if he has not engaged in an unprofitable undertaking; and because of his lack of knowledge, and hurried figuring, may even come to envy those who have given time and thought to the preparation of estimates which have not been accepted. There can be no successful estimate made of carved work if each piece is not dealt with in detail, and this cannot be done if time is not allowed for the purpose.

Walling Up. THE present manner of laying brick in dead walls gives one the impression that the quantity of bricks laid is of far more importance than the quality of the work done. The only way to obtain good solid brick walling is to either flush the joints solid with mortar every course, or make a shove joint; the former method takes too much time and material, and the latter is very rarely done except in very heavy buildings. The custom generally adopted is to spread the mortar on the bricks (a portion only of which gets in the joints) and lay the bricks on top, each succeeding course being bedded in mortar, but the longitudinal and cross joints are only partially filled, the butting joint of the brick receiving a little dab of mortar gathered on the point of the trowel by cleaning the surplus mortar from the outside joint. Grouting with cement mortar every two courses in height might be adopted for basements and first stories of buildings when great strength is required. Full headers for face bricks are better than clippings and should be specified for all heavy buildings. The face bricks are often built up fifteen or twenty courses high before the backing up is done, a custom that should not be permitted as it leaves the wall subject to many defects, as it cannot be well bonded or tied together sufficiently strong to be able to resist unequal strains successfully. For good strong work the mortar joints should never exceed five-sixteenths of an inch in thickness.

The annual election of officers of the Toronto Master Plumbers' Association held early in February, resulted as follows: President, W. J. Burroughes (re-elected); 1st vice-president, J. B. Fitzsimmons (re-elected); 2nd vice-president, J. Wilson; secretary, F. W. Armstrong (re-elected); corresponding secretary, M. P. Huffman; treasurer, A. Fiddes (re-elected); door-keeper, W. B. Inwood.

THE LATE PETER BALFOUR.

THERE passed away on the 21st of January last one of the best known and most popular citizens of Hamilton, in the person of Mr. Peter Balfour, who had been at the head of the city assessment department for nearly thirty-five years. Mr. Balfour was taken ill about three weeks ago with erysipelas, which finally resulted in his death. During his life-time he had enjoyed ordinary good health, but since a severe illness three years ago his constitution had shown signs of weakening.

The late Mr. Balfour, a portrait of whom we have the pleasure of presenting on this page, was a warm-hearted and generous Scotchman, having been born in Fifeshire, Scotland, in 1819. Coming to Canada when a youth, he settled in Hamilton in 1842, and shortly afterwards, in partnership with Mr. John Waugh, commenced business as builder and contractor. Subsequently he carried on a similar business for himself, and was also the representative of several large milling institutions.

About 1856 Mr. Balfour entered public life, being elected a councillor in the days when the city's affairs were in the hands of aldermen and councillors. In

THE LATE PETER BALFOUR.

1857, when the construction of the Hamilton waterworks was undertaken, he was chosen one of the water commissioners, and served until the works passed into the hands of the city.

Early in the sixties Mr. Balfour was appointed assessor, in conjunction with the late Mr. Tendill. He was subsequently made chief assessor, and in 1883 received the appointment of assessment overseer. Upon the rearrangement of the assessment department in 1890 he was made assessment commissioner, a position which he occupied with much efficiency and credit to himself. He was thoroughly acquainted with every inch of land and every building, and was an expert in calculations. He was noted for his sterling honesty and quiet, genial disposition. Four daughters and two sons survive him, the latter being Mr. James Balfour, architect, and Mr. Peter Balfour, of the Victoria Mutual Fire Insurance Company.

His funeral was attended by the City Council in a body, and by the city officials.

The plumbers of Ottawa are urging upon the City Council the necessity of appointing an inspector of plumbing in order that defective work may not be permitted to enter into building construction. The Builders' Union have also taken steps in the same direction.

PLUMBERS IN SESSION.

An important meeting of the Executive Committee of the Dominion Master Plumbers' Association was held at the Victoria Hotel, Quebec, on the 22nd of January. Mr. Jos. Lamarche, president of the Executive, presided, and there were also present: Mr. W. J. Burroughes, Toronto, vice-president; A. Fiddes, Toronto, treasurer; J. W. Hughes, Montreal, secretary; Wm. Smith, London, vice-president, Ontario; O. Matte, vice-president, Quebec; J. H. Doody, vice-president, New Brunswick; J. Borton, vice-president, Nova Scotia; P. C. Carroll, president Montreal branch; E. C. Mount, Montreal; and the following local members: R. Sampson, president; O. Matte, treasurer; A. Pickard, secretary; F. E. Chamberland, assistant secretary; A. Forrest, L. Z. Trudel, O. Plant, John Walker, Chas. Vezina, C. Langhan, D. Rousseau, C. Lamontagne, F. Lagace, and other members of the craft.

At 10 a. m. a secret session was held, at which the minutes of the meetings of the sub-committees of the Executive were read and adopted, as well as the treasurer's report. A committee, consisting of Messrs. Jos. Lamarche, W. J. Burroughes, R. Sampson and O. Matte, was appointed to confer with the Quebec manufacturers and dealers in plumbers' and steam fitters' supplies, and after a conference with the wholesalers the latter signed the resolutions as adopted at the Montreal convention last summer.

A motion was adopted instructing the Legislative Committee to draft a report and scheme, to be submitted at the next annual convention, regarding the advisability of having the association incorporated and adopting a seal. The vice-presidents of the different provinces gave reports of the work done, which showed the association to be gaining in strength. Local associations were being formed at Windsor and Stratford.

Messrs. Lamarche, Burroughes and Smith were appointed a committee to confer with the Toronto association of manufacturers and dealers in plumbing and steam-fitting supplies.

Toronto was the choice for the next annual convention of the Dominion Association, which will be held on July 2nd next.

A letter of congratulation was read from the Naveland Master Plumbers' Association, England.

In the evening the delegates and friends were entertained at the Frontenac by Mr. Sullivan, representing Warden King & Son, of Montreal.

On Saturday morning a photo of the members in attendance, and the representatives of the leading supply houses, was taken, which we have pleasure in reproducing. This was followed by a drive to the many interesting parts of the city, tendered to the delegates by the local jobbers.

The usual vote of thanks were passed to the local committee, Messrs. Warden King & Son and H. R. Ives, after which the meeting adjourned.

MEETING OF THE EXECUTIVE COMMITTEE OF THE DOMINION MASTER PLUMBERS' ASSOCIATION, QUEBEC, JANUARY 22ND, 1897.

1. John Borton, Halifax, N. S.
2. E. C. Mount, Montreal.
3. A. Fiddes, Toronto.
4. D. Rousseau, Quebec.
5. F. E. Chamberland, Quebec.
6. C. Lamontagne, Quebec.
7. W. J. Burroughes, Vice-President, Toronto.
8. A. Pickard, Quebec.
9. R. Sampson, Local President, Quebec.
10. C. Sullivan, of Warden King & Son, Montreal.
11. A. Huot, Quebec.
12. Jos. Lamarche, President, Montreal.
13. O. Matte, Quebec.
14. O. Plant, Quebec.
15. J. W. Hughes, Secretary, Montreal.
16. J. P. Briere, Montreal.
17. J. E. Martineau, Quebec.
18. John Walker, Quebec.
19. L. Parent, Quebec.
20. Wm. Smith, London.
21. J. H. Wynne, of H. R. Ives & Co., Montreal.
22. P. J. Carroll, Montreal.
23. W. H. Wiggs, Quebec.
24. J. H. Doody, St. John, N. B.
25. L. Z. Trudel, Quebec.
26. A. A. Belanger, Montreal.

WOOD IN ARTISTIC WORK.

Wood in artistic work is of prime service when of the right quality, flawless, and well seasoned. On this subject, a specialist writing in the Century points out some of the essentials called for, in particular that the material be white, free from gum, and soft also; white for the contrasts that will be wanted and free from resin that it may not turn black with age. As it is the fibre of the wood which is blackened or carbonized, it is obvious that the freer the wood is from gummy substances the better. The most satisfactory fire etching has been done on panels of white poplar, which is soft, white, close-grained and free from gum. Then, too, the common whitewood, or yellow poplar of America, yields readily to treatment with the hot iron, and can be successfully used in conjunction with harder, rarer woods, becoming rich and solid under the touch of the burning tool. Beautiful results are obtained by thus combining the two opposite qualities and tones of different woods.

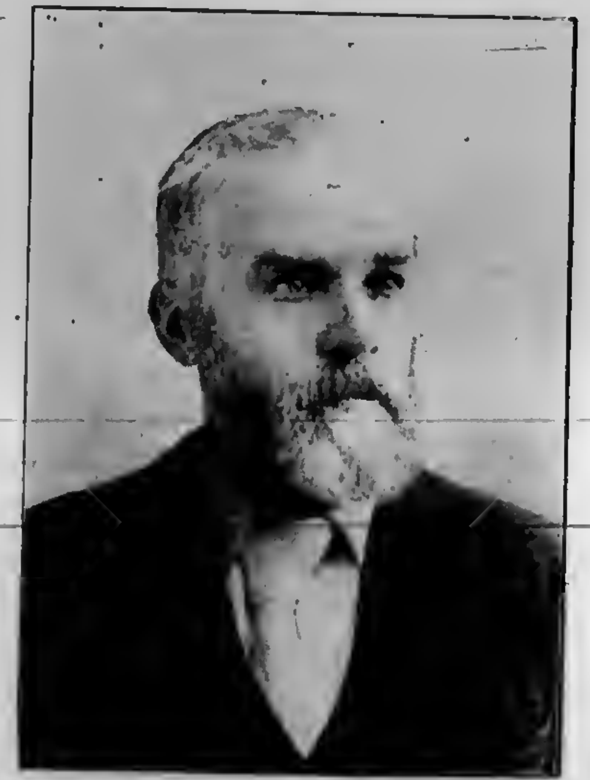
LONDON MASTER PLUMBERS.

The interest manifested in association work by the master plumbers of London should serve as a precedent to other branches of the Dominion Association who are less active in this respect. Since organization, which was effected in April last, much important work has been accomplished, and to-day every plumber in the city is a member of the Association. It is our privilege to present in this number the portraits of Mr. R. J. Haslett, past-president, and Mr. W. H. Heard, the present incumbent, who was elected to succeed Mr. Haslett at the annual election of officers in December last.

MR. R. J. HASLETT.

When the London association was first organized in the spring of last year, Mr. Haslett was chosen as the chief executive officer, filling the position with honor until the close of the year. In his work he was ably assisted by Mr. Wm. Smith, vice-president, who has been re-elected for 1897.

Mr. Haslett was born on December 16th, 1842, in Plymouth, Devonshire, England, and at the age of 15 years was bound for seven years with Philip Marshall to learn the trade of plumbing, gas and steam fitting, thus securing the thorough training characteristic of the mother country. Finishing his trade, he remained for three years with the same employer, during which time he was foreman of plumbing, etc., at the Imperial Hotel, Torquay, which required two and one-half years to execute the work. All material used was made by hand, even to some of the sheet lead, of which 40 tons was used on the roof alone. He next went to Falmouth, Cornwall, and fitted up a very large hotel there, and finished up at the Duke of Cornwall Hotel in Plymouth, Devonshire. Leaving England for New York City in September, 1867, he remained in that city for a time, then removed to Albany, N. Y., later to Rutland,



MR. R. J. HASLETT,
Past-President London Master Plumbers' Association.

Vt., and afterwards to Montreal, where he worked for one year. The following year he removed to London, Ont., working for thirteen years with E. Rogers & Co., and only leaving them upon their retiring from business. In 1889 Mr. Haslett started in business in that city for himself, and by perseverance and energy has established a snug business. He has lately been given the plumbing contracts for residences for Messrs. J. Shaw, W. D. Eckert, Thos. Barcroft, J. Harwood, John Wilkie, Rev. Geo. Wickett, and Mrs. R. Munroe, in London, and the "Brown House" at Aylmer, Ont., and is constantly extending his connection.

In the year 1872 Mr. Haslett paid a visit to England, where he married Miss Fanny M. Greep, returning to London the same year. His only son is now engaged with him in his business. In the year of the Queen's Jubilee he again took a pleasure trip to his native country, it being also his parents' jubilee, they having been married fifty years.

MR. W. H. HEARD.

The subject of this sketch was born in the city of St. Thomas, Ont., in 1858, where his father was engaged

MR. W. H. HEARD,
President London Master Plumbers' Association.

in the building trade. At the age of eight years he moved with his parents to a farm overlooking that city, where he remained until 1877, when he commenced the plumbing trade with Messrs. Essex, Murray & Jolliffe, of London. His ability was early recognized, and in 1880 he was appointed foreman of the establishment. His enterprise led him to connect himself with the London Steam Supply Company, which operated the Holly steam heating system, but this venture did not prove a financial success, and in 1881 he formed a co-partnership with James Greenway, which continued until 1893, when Mr. Greenway retired. Mr. Heard has since continued the plumbing business under the old style of W. H. Heard & Co.

Mr. Heard moved his place of residence in 1892 to the beautiful old homestead, which has been converted into a modern fruit farm. He is an enthusiast on the subject of fruit culture, and is an expert in the spraying of fruit, a subject at present so interesting to the fruit growers. He is the inventor and patentee of a spraying apparatus that has proved to be the winner of the spraying contest held under the Government auspices in 1896. In this the practical training received at the plumbing trade was the cause of his success, combining as it did the expert knowledge of the mechanic with the practical experience of the orchardist. The device makes it possible to do cement covering and whitewashing of buildings at a cost but little dearer than the price of the materials. He is manager of the Spramotor Company, which business is carried on in the same premises with his plumbing and heating trade, which, with his fruit farm, keeps him a busy man.

Mr. Heard is the chairman of the sanitary committee of the Dominion Association of Master Plumbers, president of the London association, and is an energetic

worker in anything tending to advance the interests of the plumbing trade. Although a young man, he has been past master of the A. F. and A. Masons since 1883.

A correspondent sends the ARCHITECT AND BUILDER the following communication regarding the London Association:

The greatest enthusiasm prevails in association matters in London. All the manufacturers have signed the Montreal resolutions, and there is every prospect of a new era in the plumbing business in this city. If some bright and sparkling genius could unfold a plan whereby a profit could be obtained upon work, he would be a benefactor to a trade that gets from the public the name of getting rich on each job let, yet the fact remains that it is one of the most difficult operations to make money out of the plumbing business. If the public were educated to discriminate between good plumbing and bad it might be different, but in cities the size of this the process is exceedingly slow.

We hope, however, that the coming year will see a good practical plumbing and inspection by-law enacted, that must prove beneficial to the best class of plumbers; and if it drives the other class out of a business requiring only the best ability, the result would be a great gain to the citizens as well as to sanitary science in its relation to plumbing. London Master Plumbers' Association will always be found in the foremost rank.

THE UNDERPINNING OF HEAVY BUILDINGS.*

By JULES BRENCHAUD.

THE writer refers to the great difficulties experienced in preventing injury, by settlement of heavy buildings, when it is necessary to excavate and build on the immediate adjacent building site.

The specific case treated is of a building which was to be carried 30 feet (2 storeys) below the street level, over one-half of which had to be made water-tight, as it was below water level. The total depth of foundation being 45 to 50 feet below the sidewalk, these foundations consisted of close fitting rectangular pneumatic caissons all around the exterior of the new building site and cylindrical intermediate ones for columns.

As every square foot of the property had to be built upon, the problem was to pin the adjacent buildings up during caisson sinking and construction periods. This was accomplished by placing vertical cylindrical iron columns in slits in the walls, extending from the foundation upwards. These were founded at the bottom on rock or very hard hard-pan, and at their tops the bearings were spread out by transverse horizontal slits in the walls, in which were placed nests of I beams on top of the columns.

The cylindrical columns were 10" to 30" in diameter, the smaller ones being forced down by a 60-ton hydraulic jack, in sections 5 feet long at a time, to proper bearing; some also were partially sunk by water jet. The larger ones under the heavier building were sunk by compressed air, as neither the water jet or jack would force them through a layer of hard pan to the rock.

The larger columns were first made of cast iron, but after one becoming injured by forcing past a boulder, the rest were made of rivetted steel sections.

These colums were filled, after sinking, with Portland cement concrete.

The writer then details several similar cases where the application has been successful, and concludes by stating that while this method is not (evidently) of universal application, it will be found the best means of transferring the load of an adjacent building to a lower foundation with a minimum of obstruction to the building site about to be used; also, that as these underpinnings are left in place, there is no danger of that slight subsidence which takes place when other kinds of temporary underpinning are removed.

*Reference before the Can. Society of Civil Engineers to Proceedings Am. Soc. C. E., Vol. XXII., Dec., 1896.

THE DUTY ON BUILDING MATERIALS.

BEFORE the Tariff Commissioners at Montreal Mr. W. C. Trotter, president of the Standard Drain Pipe Co., of St. Johns, Que., asked that the present duty of thirty-five per cent. upon drain pipes be maintained. Any reduction, he claimed, would be detrimental to the Canadian industry.

Mr. F. B. Dakin, representing the pottery works at St. Johns, asked that the duty on all white Rockingham and cane ware be replaced to 35 per cent., as it was before the last revision; that the duty on all printed, decorated, and china ware be advanced to 40 per cent., and that all raw material be admitted free. It was pointed out that if there was no change in the duties a French company would invest more than a million dollars in the works, and manufacture fine pottery on an extensive scale. The deputation also complained about improper valuation, and suggested that expert appraisers should be appointed by the Government.

The first representative of the cement industry was Mr. Thos. M. Morgan, who desired the present duty to remain. There were three manufactories in Canada, producing about one-fourth of the cement used in the country, but he thought there was no reason why Canada should not produce all the cement required for home use. Mr. Wm. McNally, representing cement importers, submitted the following statement:

Of the total importations of this article about 25 per cent. comes from Belgium and 45 per cent. from England, in casks weighing 350 lbs., 375 lbs., and 400 lbs. gross each. During the year 1895 the total consumption in Canada was about 255,000 casks, or, with the Government requirements, 282,000 casks, of which quantity over 223,000 casks were imported. The present duty is 40 cents per cask, specific. The standard weight of casks is 375 pounds gross. Extra duty is charged proportionately on 400 lbs. casks, but no allowance is made from the duty of 40 cents on 350 lbs. casks. The present sterling f.o.b. values range from 3s. 2d. per cask of 350 lbs. on good Belgian cements to 5s. 1d. for 375 lbs. casks in high grade Belgian and English makes—making present specific duty of 40 cents per cask equivalent to 33 per cent. to 52 per cent. ad valorem. This present duty was initiated March, 1886, the duty previous to that date having been 20 per cent. ad valorem, or equivalent to from 22 to 30 cents per cask on the sterling costs at that time, and to from 16 to 25 cents per cask on present sterling costs. Owing to improvements in process of manufacture, and more economical cost of production, the sterling costs of cement have been so reduced since 1885 that the advance from 20 per cent. ad valorem to 40 cents per cask specific, instead of being an advance of 35 to 85 per cent. in the duty (as it was at that time), now represents at present sterling costs an advance of from 60 to 150 per cent. over the 20 per cent ad valorem duty. We submit that the present duty is abnormally high and unwarranted, and we petition for its reduction to a more reasonable and equitable rate. Such reduction would bring about a much larger consumption of Portland cement in Canada, replacing lime and other interior mortars in Government and municipal public works, railway and bridge, and general building construction, thus raising the standard of such works to the level of similar classes of work in Europe and the United States.

On behalf of the New Rockland Slate Co., Mr. T. B. Bacon, secretary-treasurer, presented the following facts, requesting that no reduction be made in the present duty on slate:

The present duty on black roofing slate is 30%, but not to exceed 75 cents per square, so that the duty is 30% only on slate selling at $2.50 per square or less, which is of the lowest quality. On some of the better qualities of American slate 30% would give a duty of $1.50, were it not for the specific limit of 75 cents per square. On roofing slate other than black the duty is 30%, but not to exceed 90 cents per square; on red roofing slate, for example, the price is as high as $8.50 to $10.50 per square, on which price 90 cents is only a duty of 8¾% to 10¾%; "Sea Green" slate, which does not keep its color, is the cheapest produced, and the higher duty was put on this to stop its use in Canada.

We ask that the duty remain at not less than 75 cents per square on black roofing slate and 90 cents per square on other qualities, as we cannot compete with the low grade slate produced in the United States. Slate produced in the United States of quality equal to ours realizes as high, and in many cases a higher, price at the quarry in the United States than ours in Canada.

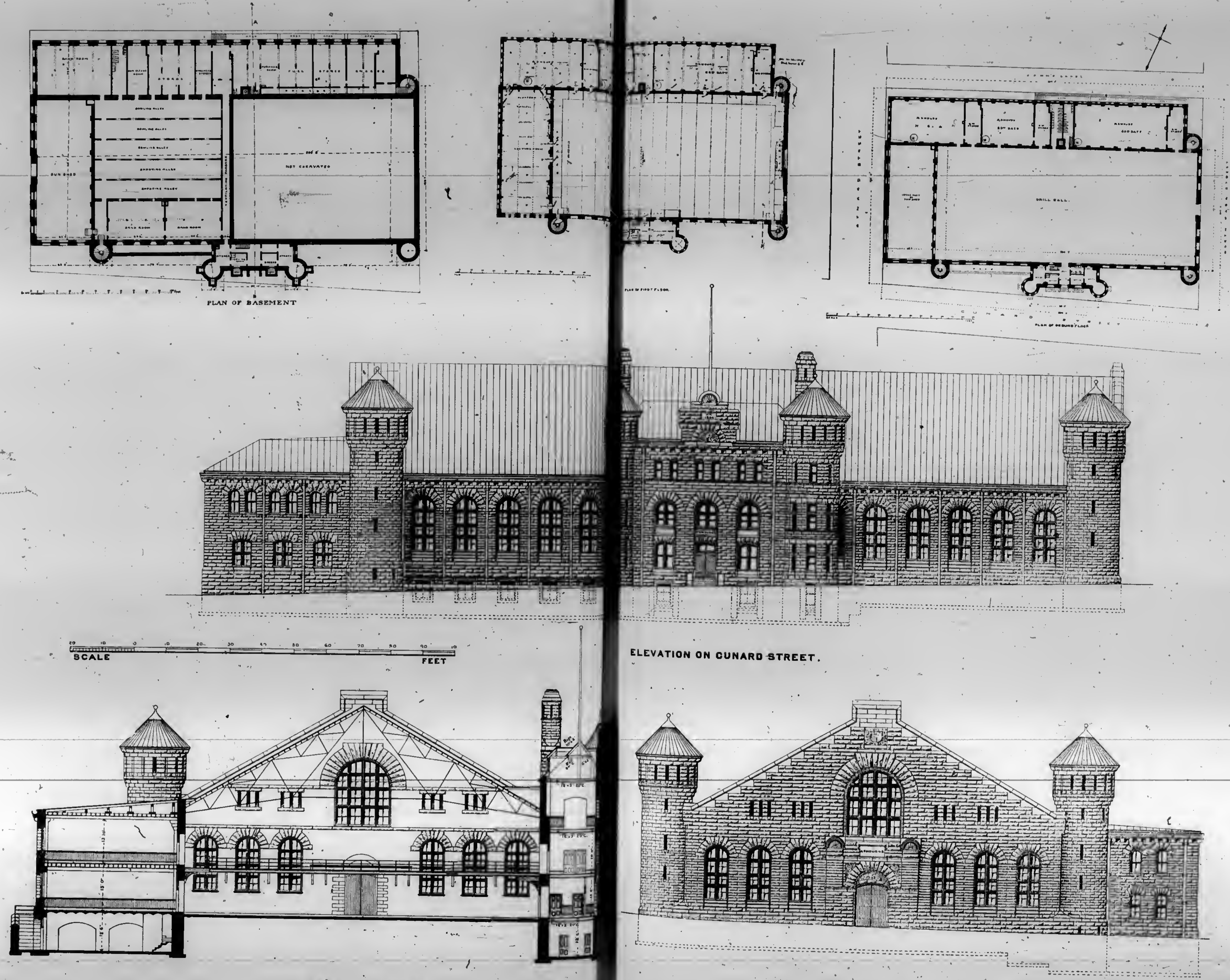
The duty on slate slab work is also 30%, and we ask that no reduction be made in this, as our slate, being tough and solid, is much more expensive to work into shape than the soft American slate with which we have to compete; and the extra cost is warranted, because, being tough, solid and non-absorbent, it is far superior to the soft and porous American slate for sanitary and similar work, in which it is largely used. Our slate compares with American slate very much as hard wood compares with soft, and its extra cost is all in the labor expended upon it.

We present herewith copies of and extracts from several letters from users of slate, who also state that they do not wish any change to be made. You will note that the Mr. Ferguson referred to in these letters is the Canadian agent for United States quarries, and naturally desires a reduction in the duty in Canada, on which his business depends.

We may say that the village of New Rockland, Que., has been built up and is entirely dependent upon the slate quarry for its existence, and the closing of the quarry, which a change of duty would bring about, would depopulate this village municipality and shut off the local market for farm produce which the village affords.

Canadian patents have recently been granted to J. M. Gander, of Toronto, for plaster board material, and to J. S. Jackson, and F. J. Travers, for steam and hot water radiator.

As the result of a conference between the special committee of plumbers appointed at the Quebec meeting and the Toronto wholesale dealers and manufacturers of plumbers' supplies, the latter have signed the agreement adopted at the Montreal convention last summer relative to the sale of goods to legitimate members of the trade. This, it is hoped, will result equally beneficial to both manufacturers and plumbers.



PLAN OF BASEMENT

PLAN OF FIRST FLOOR

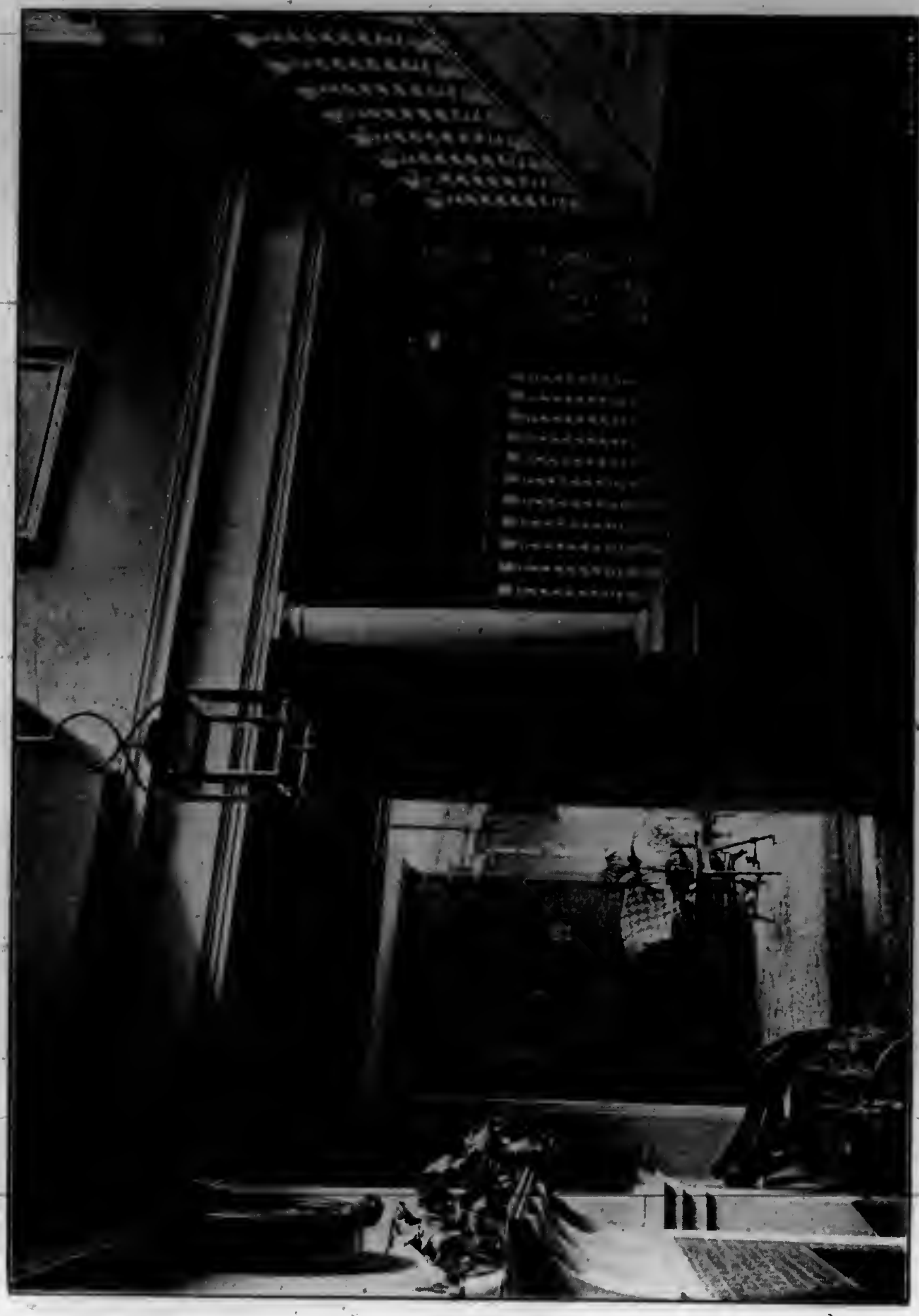
ELEVATION ON CUNARD STREET.

SECTION AT A.B.

ELEVATION ON PARK STREET

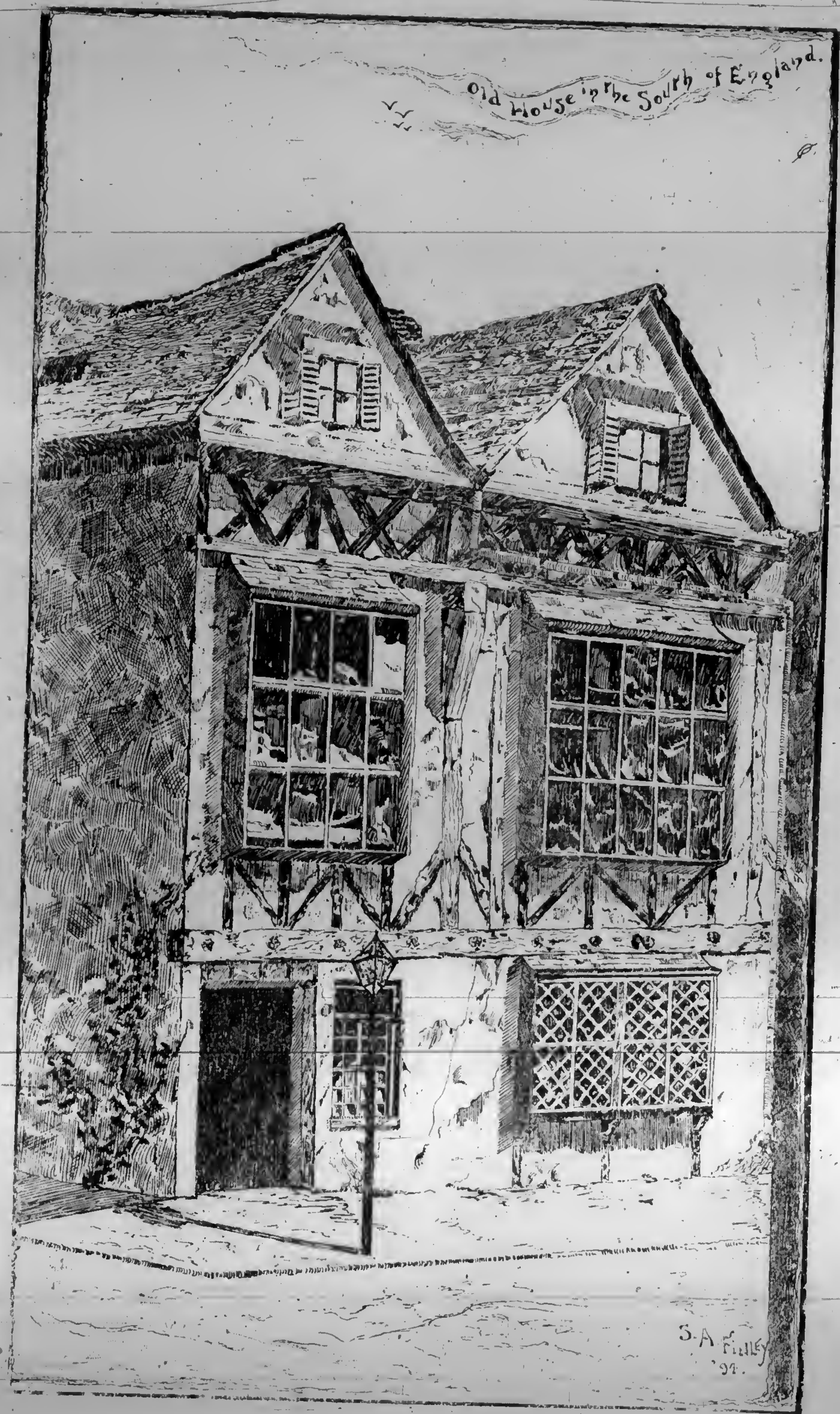
NEW DRILL HA[illegible]AX, NOVA SCOTIA.

THOS. FULLER, CHIEF ARCHITECT[illegible]ENT OF PUBLIC WORKS, OTTAWA.



Hall in Residence of R. Dixon Patterson, R. C. A., Toronto.
Darling, Sproatt & Pearson, Architects.

Studio of R. Dickson Patterson, R.C.A., Toronto.
Darling, Sproatt & Pearson, Architects.


Old House in the South of England.
S. A. Findley '97.

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—THE—

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Efflorescence on Brick. AT the annual convention of the National Brick Manufacturers Association of the United States, held recently in Buffalo, the vexed question of how to prevent the appearance of efflorescence on the surface of brick, was discussed at considerable length. The consensus of opinion of the most experienced manufacturers was that the solution of the difficulty lies in slow firing and drying and in maintaining as large a flow of air as possible through the kiln until the water smoke shall have evaporated the moisture.

Warning to Architects. ARCHITECTS need to exercise care in granting certificates to contractors to see that work has actually been done, at least to the amount of the value of the certificate. Mention has recently been made in the technical journals of instances in which damages were recovered from architects for sums for which certificates had been granted in excess of the work done. The English and Canadian courts have both decided that the architect should be held liable to pay the difference between the amount of his certificate and the value of the work done, in cases were it can be shown that the contractor has been overpaid.

Effect of Mining Speculation. IN common with all who desire to witness the prosperous development of the Dominion, we rejoice at the recent evidences of mineral wealth in British Columbia, as well as in Northern and Eastern Ontario. We would like to indulge the hope that as these evidences become widely published population will rapidly come to us, affording the enlarged home market which is so necessary to our future progress. On the other hand, it is cause for regret that seemingly this cannot take place without the evils attendant upon mining speculation. Notwithstanding the fact that Eastern Canada in general and the city of Toronto in particular, have for several years been passing through a period of severe business depression, we see tens of thousands of dollars properly belonging to the business capital of the older provinces being sunk in mining stocks. A large percentage of this money will never be heard of again, and from stocks which may prove productive no returns are likely to be received in the near future. It will thus be seen that the large amount of money which is being withdrawn from the ordinary channels of trade for

investment in mining stocks, is being locked up, and will not be again available for business enterprises of a more legitimate character for at least a few years to come. This condition of things must certainly have an injurious effect upon business in the older provinces, tending to prolong the period of inactivity which it was hoped might shortly come to an end. Architects, builders and supply merchants have reason to deplore this phase of the situation. Mining speculation should be left to home and foreign capitalists, who can afford to risk large amounts of money without jeopardizing their business interests.

Tests for Mortar.

To ascertain whether mortar contains too large a percentage of sand, and whether the sand has the necessary quality of sharpness, the American Architect recommends that the hardened mortar should be rubbed between the fingers. If the mortar be good, the sand will be firmly held by the mortar. Other methods suggested by the London Builder are, to dissolve some of the mortar in hydrochloric acid, which will attack the lime, leaving the sand, or to examine a thin section of the hardened mortar by polarized light through a microscope, which will show the shape of the grains and their proportion to the mass. In this connection recent experiments in connection with the rebuilding of the Union Station at Columbus, Ohio, are said to have demonstrated that refuse brick ground in a crusher are superior to sand for use in mortar for color work.

British Columbia Legislative Buildings.

THE new Legislative Buildings at Victoria, B. C., are completed, and it is expected that in them the session of the legislature which will shortly be called will meet. It is estimated that the ultimate cost of these buildings will approach one million dollars. They are said to be handsome structures, forming the central architectural feature of the city and province. The citizens of Victoria are congratulating themselves that the erection of these costly buildings will destroy the possibility of the removal of the capital of British Columbia from Victoria to a more central point on the mainland. In view of recent developments there is a strong probability that, but for the circumstance mentioned, such a change would have taken place. The increase of population and business which must follow the development of the mines of the province will also remove the disproportion which at present seems to exist between the size and cost of the new legislative buildings and the requirements of a territory having a population of less than 100,000 people.

Qualifications of Architects.

STEPS are being taken in Wisconsin to establish a "State Board of Architects," to consist of five or seven of the most competent and trustworthy architects of the state. The duty of the board will be to examine into the qualifications of persons who may seek to practice architecture within the State. A similar movement is on foot in California. The method of procedure proposed by the Ontario Association of Architects for guarding the interests of the public and improving the status of the profession, seems preferable to the one mentioned. Our readers are familiar with the object which the Association is seeking to attain. It is proposed to restrict the use of the title Architect to persons who shall be known as practicing architects at the time of the passing of the Amendment to the Architects' Act, and to students who shall have given proof of their knowledge and ability by passing a satisfactory qualifying examination. Under this method, no hardship or injustice would be imposed on any one, while the status of the profession would, in the course of ten or fifteen years be materially improved.

Protection of Public Buildings.

THE partial destruction by fire of one of the Departmental Buildings at Ottawa last month, revealed a disgraceful neglect of duty on the part of the persons charged with the responsibility of keeping the protective appliances within and without the buildings in serviceable condition. When needed these appliances were found to be useless—the hydrants being frozen and the hose so rotten as to be incapable of withstanding the water pressure. As a consequence of this condition of neglect, and of the fact that it has not been considered desirable in recent years to place any insurance upon these buildings, the public treasury must now be drawn upon to the extent of probably half a million dollars to pay the cost of repairing the damaged structure. The staff of officials at Ottawa is large enough and expensive enough to leave no excuse for the neglect to which is largely due the loss which this fire has imposed on the country. The wisdom of entirely discarding insurance seems open to question. Is it not false economy to leave the country constantly exposed to the danger of losing property valued at millions of dollars for the sake of saving a few thousand dollars per year in premiums? We are surprised to observe that the provincial authorities of Ontario are following the example of the Dominion government in this matter, and are relying upon their fire protective apparatus and employees for the protection of the new legislative buildings. Incidental reference may fittingly be made to the fact, revealed by the Ottawa fire, that the Government Buildings are well constructed. The stone and brick work came through the ordeal intact, and if the building had been roofed with iron, in accordance with the plans and estimates presented by the architects at the time of its construction, the damage would have been trifling.

CHIPS.

The annual meeting of the Silica Barytic Stone Company was held at Guelph recently. The election of directors resulted as follows: Walter Mills, Ingersoll, president and general manager; A. C. Macdonald, Toronto, vice-president; Mr. Ewart, Ingersoll, secretary-treasurer; J. R. Stratton, M.P.P., Peterboro, and C. Kloeper, Guelph.

The Lake Medad Portland Cement Company is seeking incorporation, being composed chiefly of Hamilton capitalists. It is proposed to manufacture Portland and hydraulic cements, lime and builders' supplies at Lake Medad, a short distance north of Hamilton, and to erect mills for the purpose. The first directors will be: Ald. Dixon, Ald. Montague, S. D. Biggar, Lyman Lee, W. L. Cummer, M. Turnbull, W. A. Holton, A. Leitch, all of Hamilton, and Charles H. Holton, of Easton, Pa., president of the American Horseshoe Company.

On the 3rd of August, 1896, two men were killed by an accident while working in the Berri street drain in Montreal. The widow of one of the victims has since brought an action against the contractor, Mr. Jos. F. Houle, claiming $3,000 damages for the death of her husband. It is contended that the contractor neglected to employ the usual precautions to provide against accidents. She alleges that it is customary to put lime in a newly opened drain, to absorb any noxious gases, before any one goes down into the drain. This, it is claimed, was not done. The contractor claims, on the contrary, that he is not responsible for the accident.

SUNDAY SCHOOL PLANNING.*

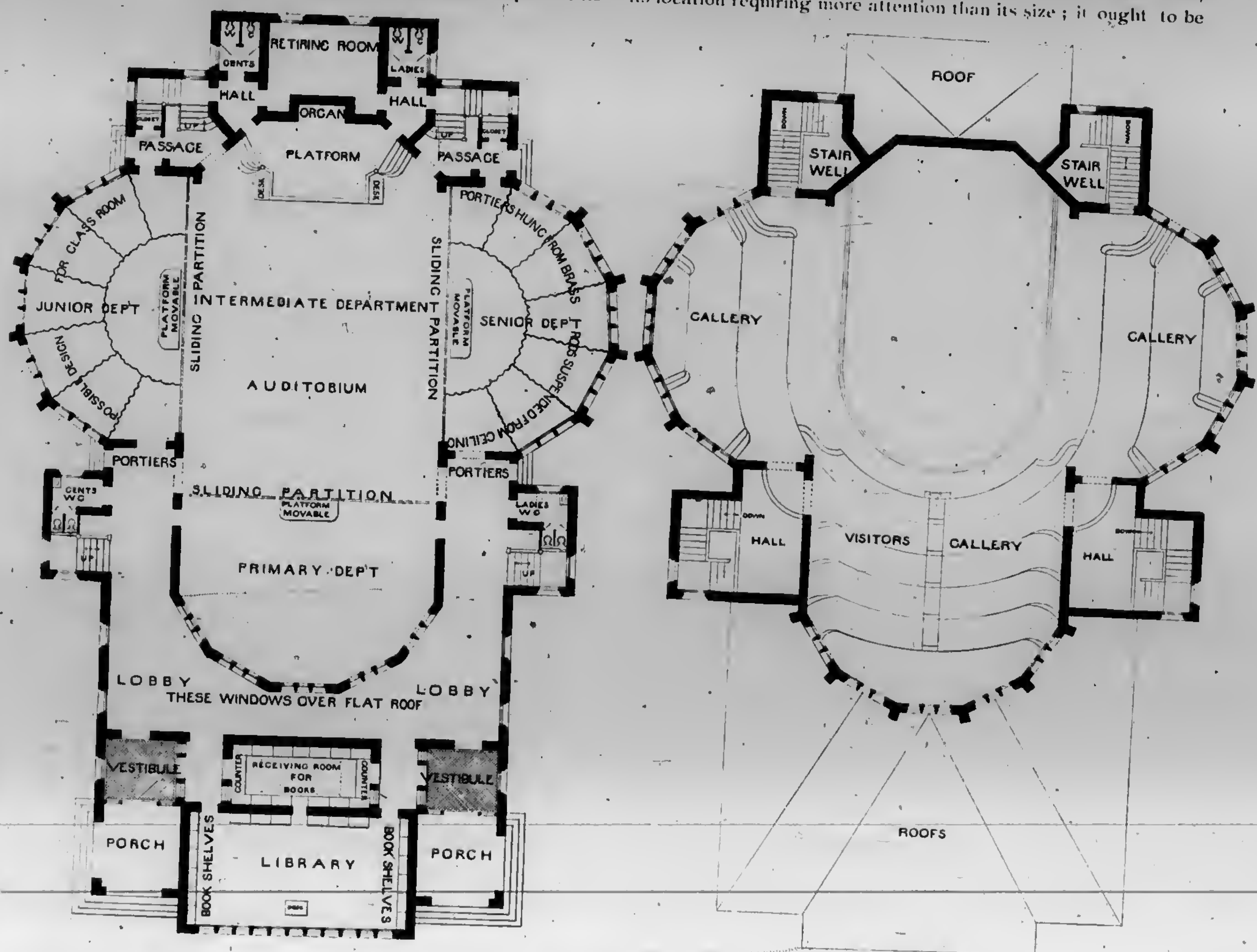
By A. F. WICKSON.

My paper this evening will not be so much an attempt to suggest the actual planning of school rooms as an effort to rapidly point out the requirements of these buildings, the working in of which will, of necessity, depend much on circumstances, such as size, shape of lot and the adjoining church premises, if there are any.

During the past few years the planning of Sunday school buildings, like that of almost everything else, has been undergoing the most radical changes. Although the one large square room, fiercely heated in the neighborhood of a tremendous box stove, and cold enough to paralyze one anywhere else, has long since been superseded by more comfortable rooms, properly warmed, it is only during comparatively recent times that any systematic arrangements for the separation of different divisions of the school have been seriously considered.

Now a well equipped Sunday school building is almost a more complete piece of planning than the church to which it belongs.

It is considered necessary to have both classes and departments



BALCONY PLAN

divided, for several reasons, one being that as scholars grow older they have a disinclination to be in the same division, no matter how large it may be, with the smaller children, and another being that to get and keep the attention of the scholars it is desirable to prevent them having unlimited view of the whole room and the other classes; many a boy who would hesitate about pulling another's hair in the same class would be delighted to distract the attention from his teacher of some other boy in another class.

But there are many uses for a school room besides that of having classes on Sunday afternoon; there are open sessions of public reviews, and it is the place in which are held all the events connected not only with the Sunday school itself, but those also apart from strictly devotional services pertaining to the church; besides the usual mid-week prayer meeting, there are lectures, festivals, concerts, socials, etc., and for all of these a room undivided is necessary.

To plan a building to suit meetings of these different characters, the space must be divisible when necessary and be also entirely open when occasions call for it. To accomplish this double requisite many devices have been tried, apparently the most successful of them being a combination of rolling shutters, either vertical or horizontal, and curtains on poles—the former constituting divisions between compartments and the latter between classes.

In addition to the teaching and lecture room proper, there are many other features essential to the well appointed school to which I would draw attention. In so few cases is a school house erected separately from the church that one usually has to provide for rooms other than those solely required by the former.

There ought at least to be two cloak rooms—one for each sex—as without these the seats become very much crowded with clothing, thus interfering materially with the comfort of both scholars and teachers, and so long as overcoats are right beside them it is always a temptation to the boys to struggle into them during the closing prayer. These rooms also add much to the comfort of adults at church gatherings of any sort, as wraps otherwise so cumbersome can be thus dispensed with.

The library is an important, though comparatively small room, its location requiring more attention than its size; it ought to be near the entrance, but still so planned that pupils will not have to stand in a common thoroughfare and thus incommode others passing.

A very desirable addition is a retiring room at the side or rear of platform, and if the partition at back of platform be a removable one, this retiring room, if just behind it, could on occasions when the children themselves are performers at any entertainment, be used as a choir gallery by having removable stepped platforms.

The basement of a school house should be well fitted up and the heating, as far as possible, kept from interfering with the clear area of room, so that Boys' Brigade companies can be instructed in it without the necessity of disarranging the seating of the school itself. This room will also be extremely useful for festival teas, etc., and should have in connection with it a very respectable pantry, accoutrements, etc., and a sort of scullery where from a separate meter, in places where the gas is not all one price, a gas stove can be used. There should also be a literary room for the Boys' Brigade, and another for their room for accoutrements.

There must ordinarily be a minister's vestry, which should be

* Paper read before the Toronto Chapter of Architects.

so placed that besides being convenient to the pulpit entrance to the church should be easily accessible and in a pleasant location, as often a pastor spends much time in such a room.

Usually one or two good sized rooms are required for general purpose use, and are called parlors, but in the case of a building divided as above one compartment could be utilized as a parlor.

Some large and extensive churches have quite extensive auxiliary institutions in connection with their school, such as good baths, gymnasium and reading rooms; these are sometimes in a separate building and sometimes under the same roof as the school; such institutions are found very attractive in places that are deficient in that sort of thing outside of the churches. There are none like this in Toronto that I am aware of, but some day some wealthy church may want model school and auxiliary buildings, and it is well to remember that whatever one's private opinion may be in regard to the propriety of them there are these accessories.

Experience seems to prove that a two-story building is not satisfactory, for while it certainly gains much room it also causes inconvenience and a good deal of grumbling; it is not long since we gave an estimate for remodelling a school house of that description, the church board seriously entertaining the idea of dispensing with the upper story.

A one story building with clerestory lighting and galleries seems to suit better than any other, as while the main rooms are all on the ground floor the gallery space can become practically part of the school. Most schools have been erected on this principle lately, and amongst others the World's Fair Sunday school building, of which I have made rough plans, and which by many interested people is rated as the nearest approach to a perfect building, though this may be a somewhat exaggerated idea. In this plan there are four departments (see plan), and in regard to the satisfaction which this building has given I will read some extracts from letters received in reply to enquiries made by myself (extracts read.)

Personally I have strong misgivings as to the efficiency of the shutters to exclude sound of primary class singing from other departments, and as they have a good deal of singing, such a defect would be serious; possibly double shutters with a space between might accomplish the purpose, and I believe in some instances have already been resorted to.

All floors are now made on the level, except in the galleries, and that suits much better than the stepped floors even for primaries, and in some departments the system of furnishing consists in large or small tables with individual small chairs around them.

The plumbing has to be taken into serious consideration, both as regards the number of fixtures and the location of them. One of the toilet rooms should be very near the primary class, and there should be one for ladies, one for men and boys and one for minister's vestry.

No portion of the ventilation requires more consideration than that of the infant class. I have frequently gone from a large room well filled with scholars into a primary department and have been struck with the unwholesomeness of the latter compared to the former; unless provided with a plentiful supply of fresh warm air and a good outlet, the room becomes very offensive. This department should be in a good bright sunny position—indeed a pleasant room helps most effectually in all the departments. To such an extent is this realized that one school has been fitted up with a fountain in the centre, nicely surrounded by flowers. One can easily imagine that such an addition would do much to exercise a refining influence on the scholars. While the teaching is in progress the running water helps to mitigate the confusion of many talking at once, and when an address is being given from the platform the water is turned off. I could safely guarantee that this school would be the most popular in America if they would only turn on lemonade instead of water.

Unless the whole building is to be kept heated continuously all winter through, which few really are, it is necessary to arrange the heating apparatus so that one parlor, the minister's vestry and all the toilet rooms at least, will never be without heat, as some part of a well conducted institution is sure to be required nearly every night.

For large schools it is necessary to have separate entrances for boys and girls, and at least one of these should be so placed as to be prominently seen from the main street upon which it abuts, so that for week evening services there may be no difficulty in noticing the doorway. Sometimes they have been so arranged that the doorway being behind a transept or some other projection, or the front of the building occupied with minor rooms not lighted up, it is really difficult to know whether the place is open at all or not. A good example of a good entrance is the Presbyterian church school at the corner of College and Bathurst streets in this city.

Whatever may be the verdict in regard to the plans of the model building, the elevations certainly will not stand criticism. —the fourth prize man having by far the nearest approach to a good design.

BUILDERS AND THE PROPOSED AMENDMENT TO THE ONTARIO ARCHITECTS' ACT.

A MEMBER of the Council of the Ontario Association of Architects in order to test the feeling of builders with regard to the proposal to make the name Architect a title obtainable only by training and examination has submitted the bill to three prominent builders in his own neighborhood—the Ottawa Valley. The following letters were received in reply.

ARNPRIOR, February 17th, 1897.

ANDREW BELL, ESQ., Almonte.

DEAR SIR,—I have received from you and carefully read over the proposed Bill, an Act to amend the Ontario Architects' Act, and can assure you I am fully in sympathy with its object, both as a private citizen, and as a builder of 30 years' large experience.

I am in the habit ot making plans for building, but do not wish to be called an Architect, and am sure that your Bill, if passed, will not interfere with me in that respect. I have found by experience that I can get on better with a building when superintended by a properly qualified Architect than when by one not so. I am strongly in favor of any measure that will tend to educate and elevate the profession of the Architect.

Yours truly,

B. V. STAFFORD,

Mayor of Arnprior and Builder.

ALMONTE, ONT., March 6th, 1897.

ANDREW BELL, ESQ.

DEAR SIR,—I have read over carefully the copy of proposed Bill to amend the Ontario Architects' Bill and explanatory circular you handed me, and I heartily agree with its object.

As a builder of thirty-five years' experience, having put up buildings in Ottawa City, and almost every town of any size in the Ottawa valley, I believe that anything that will tend to elevate the noble profession of architecture is a movement in the right direction, and will be a great benefit to those engaged in it in the future, as well as to builders and the public at large, and this movement of your Association will certainly be strongly in that direction. It seems to me to be decidedly educational, and I cannot see how it will in any way interfere with the rights of builders—much more likely to help them. I very much prefer erecting a building from the plans and under the superintendence of a properly trained Architect than one without that qualification. When the title "Architect" is a distinguishing one, it will be one worth studying for and striving for, and must hereafter improve the appearance, as well as the sanitary condition, comfort and safety of our villages, towns and cities.

ROBERT CAMERON, Builder.

CARLETON PLACE. 12th March, 1897.

ANDREW BELL, ESQ., Almonte.

DEAR SIR,—In reply to your letter with copy of proposed Bill to amend the Ontario Architects' Act, and also Mr. Langton's circular explaining it, I have to say that as a builder and a citizen I fully approve of it, believing that it will be the means of educating in the future a higher class of Architects, and so tend to improve our public and private buildings, which is much needed in this province. I have had thirty years' experience as a builder, and I speak as I feel I should on this matter.

Yours,

W. PATTIE.

Builder and ex-Mayor of Carleton Place.
Ex-Warden of the County of Lanark, and
now County Councillor.

These letters, from men of experience and judgment, seem to cover entirely the builder's point of view.

TORONTO CHAPTER OF ARCHITECTS.

THE regular meeting of the Toronto Chapter of Architects was held on Monday, March 8th, Mr. W. R. Gregg in the chair. Mr. Jos. Keele, of the School of Practical Science, gave an interesting stereopticon exhibition of architectural views, and Mr. G. F. Strickland read a paper entitled "Modern Methods of Electric Wiring." The three retiring officers of the Executive Committee were nominated for re-election.

MONASTIC INFLUENCE.

PROF. Capper recently delivered at McGill University his tenth lecture on Architecture, the subject being "Monastic Influence, as seen in the Development of Ecclesiastical Architecture." The Durham Cathedral was illustrated and described as one of the finest Romanesque churches in existence. The existing buildings attached thereto still showed the typical arrangement of a Benedictine monastery. These were compared with the much earlier plan (dating from the ninth century) still preserved of the monastery of St. Gall; some of the special points embodied in the famous Rule of St. Benedict, promulgated in 529 A.D., were touched upon to emphasize the work done by the monks on behalf of progress and civilization and the arts during the centuries when Europe was slowly raising herself from the barbarism that followed the northern invasions and the fall of Rome. The Benedictine Rule rapidly spread over Western Europe, though not to the total exclusion of other rules, notably the Augustinian. Architecturally considered, however, the rules were practically identical, and gave rise to a definite type of plan, in which a rectangular cloister, with certain definite buildings grouped around it, was invariably attached to the nave and one transept of the church. These buildings were, on the east the Chapter House, on the west the undercroft, usually containing the great cellar for stores, and, on the side furthest from the church and running parallel to it, the refectory of the monks. The dormitory was usually in an upper storey on the eastern side and connected with the transept by a stair, so that the monks, for whom matins began at midnight, might have ready access to the church. The cloister was the workroom of the monks. In it, against the wall of the nave, was situated the library of the monastery, the scriptorium, in which the literary work of monks was executed, being in the cloister alley next the church; the separate cells, or "carrels," were divided off by low partitions, usually of wood.

Several beautiful views of existing cloisters were given; all, however, save that of Le Puy, in France, as rebuilt at a later period.

The finest scriptorium that has come down to us is probably that of Gloucester, rebuilt in the fourteenth century, where the "carrels" are of stone and form a beautiful architectural composition. Some examples of illuminated MSS. were shown, and the lecturer took occasion to remark upon the excessive labor represented by such work, for which the world could not be too grateful to the scribes of these old cloisters, who must have toiled, often infinitely weary of their task. The Benedictines (to whom teaching was a duty of religious obligation) became inevitably a learned order, comprising within their ranks "some of the strongest and ablest men" of Christendom; but literary work was by no means their only form of labor. On the contrary, the great strength of St. Benedict's Rule was that it raised labor of all kinds, from the humblest to the highest, to be definite work for God, consecrated, therefore, as religious duty, a complete revulsion from the degradation of Imperial Rome, when all manual labor was regarded as servile, the work of slaves, unfit for free-born men.

LUXFER PRISMS.

THE wonder is that the simple, well-known power of refraction in a glass prism wae overlooked so long, and not utilized until the investigations of Mr. J. G. Pennycuick led him to make a practical use of the semi-prism to carry ordinary rays of sunlight, dispelling darkness and replacing objectionable gas or electric light.

By using a great number of small semi-prisms to cover a considerable surface of the window, the light from the sky, in passing through them, is refracted or diverted, and leaving the prisms, is carried along on a horizontal plane to the furthest limit of the room—hence the name "Luxfer" or "light carrying" prism. Through ordinary plate glass, a part of the light is reflected outside, and the remainder comes through the glass in a straight line, illuminating the floor close to the window and leaving the rest of the room comparatively dim.

About a year ago The Prismatic Glass Company, of Toronto, took up Mr. Pennycuick's invention and brought it before the public as an article of commerce. The result has more than exceeded their expectations. At the same time, the company spared no efforts to improve and perfect the original invention A laboratory has been fitted up and scientific experts employed to make a number of experiments and, by practical tests, to determine the exact size and angle of prisms required to attain the best results under the varying circumstances found in broad or narrow streets and in low or lofty buildings. The company can now undertake to supply "Luxfer Prisms" suitable to buildings of any size or location.

In addition to perfecting the prisms the Company has also adopted a new process of electrolytic glazing, which is a great improvement on the old method of lead or copper glazing. By this new process the small prism squares are united in sheets of any size, by a thin framework of copper, deposited between the squares by electricity, making a neat, strong, weather tight sheet of the prisms. This process also adds about 20% more effective refracting surface for the transmission of the light.

In stores a transom light of Luxfer Prisms will spread a diffused light throughout the darkest store. In office buildings the upper half of a window glazed with Luxfer Prisms will light up the dark corners of the office, leaving the lower half clear for other purposes. In private houses, dark halls or back rooms can be brightened up and made cheerful by a panel glazed with Luxfer Prisms.

Luxfer prisms are also used with the greatest success for lighting dark basements, through sidewalk or area lights. Basements that would be otherwise dark and damp can be filled with light and made suitable for business purposes, adding just that much valuable space to the earning capacity of a building.

Owners of old buildings as well as new ones can make their premises attractive to prospective tenants by offering them bright, well lighted stores and offices—and the renting value of property can be much increased by judicious use of this new invention.

For the purpose of demonstrating in a practical form the utility of this new method of lighting business premises, the Luxfer Prism Company have put in an exhibit at their new premises at 58 Yonge street, Toronto, showing the different methods of using Luxfer Prisms both for window and pavement lighting. They show a novelty in the form of a glass and iron pavement by which a basement can be brilliantly illuminated, without gas or electric light. Architects and builders are specially invited to inspect the various exhibits on view.

TO KEEP LIQUID PAINT IN GOOD WORKABLE CONDITION.—A good idea has occurred to an inventor to prevent liquid paint which, for convenience sake, is kept in small quantities and flat receptacles, from evaporating and drying. He gives the vessels such a shape that they can be placed one on top of the other without danger of falling over, and provides the under side with a porous mass, felt or very porous clay, etc., which, if moistened, will retain the water for a long time. Thus, in placing the dishes one on top of the other, a moist atmosphere is created around them, which will inhibit evaporation and drying of the paint. A similar idea is guiding the inventor in producing covers with a tight outside and porous inside, for the purpose of covering up, during intermission in the work, clay models and like objects which it is desired to keep soft. In order to avoid the formation of fungus growth on the constantly wet bottom, it may be saturated with non-volatile disinfectants, or with volatile ones if their vapors are calculated to act upon the objects kept underneath the cover. If the cover is used to cover up oil paints, it is moistened on the inside with volatile oil, such as oil of turpentine, oil of lavender, or with alcohol.

ANNUAL MEETING OF THE R. C. A.

THE eighteenth annual meeting of the Royal Canadian Academy of Arts was opened in Ottawa on the 9th inst., by Their Excellencies the Governor General and Countess of Aberdeen. In the unavoidable absence of the president, Mr. R. P. Harris, the chair was occupied by the vice-president, Mr. A. C. Hutchison, of Montreal, who referred in his address to the advance which had been made in art in Canada within the last few years. This progress was indicated by the many fine specimens which adorned the walls of the gallery. Mr. Hutchison introduced His Excellency, the Earl of Aberdeen, who expressed his appreciation of the artists' work and the good the Academy was doing.

The exhibit this year was much larger and of greater variety than that shown at the Exhibition in Ottawa three years ago, and consisted of 150 oils and 66 water colors. In addition, there were seven architectural sketches and paintings and one sculpture by Mr. Hamilton MacCarthy, of Toronto, consisting of a medallion terra cotta representation of the head of Rev. Henry Scadding.

The officers elected for the ensuing year are as follows: President, Mr. Robert Harris, Montreal; vice-president, Mr. A. C. Hutchison; secretary-treasurer, Mr. James Smith. Mr. Pinhey, of Hudson, was elected an associate member; Prof. Capper, of Montreal, associate architect; and Miss Lawrence Carlyle and Miss Howden, associate artists.

A REVOLVING PALACE.

ONE of the most wonder-exciting features yet proposed for the Paris Exposition of 1900, is an immense illuminated revolving tower. This tower will be hexagonal in form, constructed of steel, ornamented with nickel, aluminum, decorated with faience ware, crystal, mirrors, etc. It will reach a height of 115 meters. There are four grand divisions, each of which is subdivided into floors or galleries. The first and second parts will comprise five floors each, the third six, all accessible to the public. The upper portion will comprise eight galleries, of which the first three will be open to the public. Throughout the structure will be found cafes, restaurants, theatres, shows, etc., in extravagant profusion.

All of the ornaments, columns, capitals, statues, etc., are to be of colored glass, and comprise all the tints of the rainbow, the various pieces being strengthened and held by delicate iron framework. By day the effect will be marvelous, while at night the statues, the garlands and the transparent balconies will glow with the light of thousands of internal electric fires. The colossal system of illumination will comprise about 20,000 incandescent and 2,000 arc lamps which will outline all the borders of the decorative effects, and, aided by the crystal reflectors, perfectly show every design.

In the upper regions of the structure will be placed huge organs operated by air, steam or electricity, while a chime of 64 bells operated similarly will accompany the wind instruments.

TO REMOVE SCRATCHES ON PLATE GLASS.—To remove slight scratches on plate glass, first clean the surface with a pad of cotton wool, then cover the pad with cotton velvet charged with fine rouge. This will not only remove the scratches, but will also impart a great brilliancy to the glass, which should be the object whenever the cleaning process is pursued. Glass should be not only clear, but brilliant as well, and this comes of polishing.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The Council of this Association have arranged a course of lectures for 1897, to be held, by the kind permission of the Art Association, in their galleries, Phillips Square, Montreal.

With a view to promote cordial relations and good fellowship amongst the members, the Council have also arranged for two dinners to be held during the session in the Queen's Hotel.

The first of the above-mentioned series of lectures was delivered by Prof. Capper on the 22nd of Jan., the subject being "The Egyptian Pyramids and Their Builders." By courtesy of the author, an abstract of this lecture was printed in the CANADIAN ARCHITECT AND BUILDER for February. Owing to inability on the part of Mr. A. C. Hutchison to deliver his lecture on "The Gothic of Northern Italy" according to arrangement, Prof. Peterson's lecture on "The Monuments of Athens" was substituted. Lectures by Mr. Hutchison on the subject named, and by Mr. A. T. Taylor, on "The Story of An Illustrious Abbey," will conclude this interesting series.

At the first of the dinners, held on the 26th of January last, there was a good attendance, and the occasion proved to be a pleasant and profitable one. Mr. A. T. Taylor, the president, occupied the chair.

Several toasts were proposed. Mr. A. T. Taylor in a most pleasing speech described the principal libraries of the United States, such as Boston, Columbia and Washington; and Prof. Capper, of McGill University, spoke of the necessity of having a School of Architecture, and hoped that in time McGill would be placed on the same footing with all other schools of this kind in the United States and foreign countries. He stated that he would probably make a visit to the principal university schools of architecture in the United States.

During the evening Messrs. Wright and Davis entertained the company with well rendered songs.

The evening was a most enjoyable one, and praise is due to the committee in charge, as well as to the presiding officer.

At a late hour the dinner was brought to a close.

PERSONAL.

Messrs. A. Hall & Son have commenced business as plumbers at Sherbrooke, Que.

Mr. John Guest, who formerly conducted a plumbing business in Toronto, died in New York last month.

Lieutenant Paul Weatherbee, of Halifax, has received the appointment from the Dominion government of architect of the Militia Department, to replace Lieutenant Fred. White. Mr. Weatherbee is a son of Judge Weatherbee and a graduate of the Royal Military College, Kingston.

Colors that are produced by heat will change under the influence of heat of a different character or temperature; they all generally deepen. Pigment colors produced by the dyeing process, fixed by a mordant upon some base, bleach out and expose the whitish base upon which the dye was applied. These are the reasons that some colors fade light and others fade darker.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

UNFAIR COMPETITION.

VANCOUVER, B. C., March 4, 1897.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Enclosed please find two dollars, my subscription to the CANADIAN ARCHITECT AND BUILDER. Things have been very bad in the building trade here. It is so hard to get hold of a few dollars even after one has earned them. A great deal of harm is being done by persons taking contracts who haven't a cent to lose, and who take the work so low that a bona fide contractor has no show to compete and pay wages. There are carpenters working here for $1.50 per day, and many of the so-called contractors don't make $1.00 per day. I think that you ought to censure our architects for assisting to make possible such a condition of things, for I think your paper does a great deal of good in this direction.

Yours truly,

S. G.

[It should scarcely be necessary for us to point out to architects the injustice of placing unskilled and financially disreputable contractors in competition with qualified and honest men, who in tendering try to make provision for the discharge of their honest liabilities. The evil results of such unfair competition must ultimately come back upon the architects themselves. The effect will be to drive reputable contractors out of the city, thus leaving the business in the hands of the "Cheap-Johns," who have neither the knowledge nor the disposition to do a good piece of work, when such is required.—EDITOR C. A. & B.]

COST OF EXCAVATING.

CHATHAM, ONT., Feb. 25, 1897.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Would you kindly furnish me with the approximate cost per cubic yard of removing material (clay and fine sand) from a pit about 800 feet long, 90 feet wide and about 8 feet in depth, with sloping sides about 1 in 1½, containing roughly about 20,000 cubic yards. About 11,000 cubic yards of the material excavated is to be banked on the sides to a height of about 6 feet and the balance of the excavated material is to be hauled to an average distance of 600 feet. The work is to be done by scraping the earth on to the embankment by horses and scraper, and the balance of the material to be excavated to be removed by waggons and wheel scrapers to an average distance of 600 feet. The wagons to be filled by men with shovels. The material is easy to dig and there is no water to contend with. The cost of teams per day, $3; cost of men, $1.25.

E. B. JONES,
Supt. Chatham Waterworks.

[In answer to our correspondent's enquiry we beg to submit the following:

Cost per cubic yard of loosening earth	2½	cents.
" " " loading in carts	5	"
" " " hauling 600 feet	8	"
Contractor's profit	2½	"
Total cost per cubic yard	18	cents.

If the embankment is to be carried up 6 feet above the natural level, as the enquiry suggests, then a portion of the earth will either require to be handled twice by shovellers or otherwise carted out of the cutting to the bank of the embankment. The cheaper way, of course, would be to cart the earth from the cutting to a platform, and again from this platform to the embankment. All the conditions are not given, but judging from what can be gleaned from the enquiry, we should think that 20 cents per yard would be the average cost of the work complete.—EDITOR C. A. & B.]

RECENT CANADIAN PATENTS.

HENRY Stauton, of Flushing, Ohio, has obtained a patent in Canada, No. 54,558, for a hot air furnace, having the combination of a grate, a brick fire-pot, and a perforated top over the fire-pot, a metal arch enclosing said fire-pot and top and arranged to direct the products of combustion downward, a cold air heating chamber enclosing said arch, and flues arranged to draw the products of combustion downwards between the fire-pot and arch and keep them separate from the air in the air chamber.

A patent, No. 54,569, has been granted to Lewis Skaife, of Montreal, for a sewer trap.

Mr. J. M. Gander, of Toronto, has taken out patents for a plaster board, comprising a composite material made in flat form with one underlying flange designed to be affixed to the joists, and overlapping flange fixed over the underlying flange of the abutting end of the adjacent board, with longitudinal tongue in one edge of board and a groove in the opposite edge, and a series of depressions or recesses formed in the back of the board. This board is designed to be fitted directly to the joists of ceilings and walls, and is formed of a composition of plaster of Paris, ground asbestos and grassy fibrous non-igniting material. Mr. Gander has also patented a fire-proof covering for steel beams.

A patent for a brick kiln has been granted to Edward M. Pike, of Chenoa, Illinois.

Albert B. Shantz, of Caledonia, Ont., has secured a patent, No. 54,664, for a ventilating apparatus.

A new roofing compound has been patented by T. Sparham and Jas. Thompson, of Lyndhurst, Ont. It is claimed to be a roofing having the felt or paper covering fastened by wires, secured by staples, and covered with a compound composed of blue clay and coal tar mixed together and spread while hot.

A water filter patent has been granted to James H. Blessing, of Albany, N. Y.

A CREDITABLE PUBLICATION.

MR. O. T. Springer, Burlington, Ont., writes: "I received your New Year number, and must congratulate you on your effort; it is very creditable to you when your somewhat limited constituency is taken into consideration."

CORRECTION.

IN our annual building review published last month it was stated that the Canada Life Building in Montreal was built in Ohio sandstone. This was an error, as the building is built in Oxford bluestone from Wyoming county, New York State.

Mr. Peter Brown, an Ottawa contractor, accidentally took a dose of carbolic acid, and at time of writing is in a precarious condition.

BY THE WAY.

I HAVE been wondering whether to luck or some more tangible cause is to be attributed the decrease of $447,725 in fire losses in Canada in 1896 as compared with 1895. It would be interesting to learn whether improved methods of building construction or more efficient fire protective devices had anything to do with this improved showing.

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AN individual bearing the scriptural name of Emanuel distinguished himself in Toronto recently by his altogether unique method of securing employment. Emanuel, surnamed Dunn, and by trade a stonecutter, was charged in the Toronto Police Court with having written a letter to a party in Rockland, Que., to which he signed the name of a well-known contractor, stating that there was any amount of work in Toronto. On the strength of this letter several stonecutters threw up their employment at Rockland and went to Toronto, only to find on arriving there that they had been deceived. Meanwhile, Emanuel is said to have betaken himself to Rockland and secured one of the vacancies which he had been the means of creating.

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THE California Architect points to a peculiar oversight in the bill now before the New York Legislature for limiting the height of buildings. The bill provides that no building shall be erected of greater height above the curb level than fifteen times the square width of the street, but neglects to say what denomination that width shall be taken in—whether feet, inches, yards or miles. The California journal aptly remarks that although the ordinary public would consider that feet are meant, there is no telling what the lawyers and judges would hold if the matter was brought into court by someone wishing to erect a building higher than implied in the act, for the ways of such are like the ways of Providence, past finding out.

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THE building inspector of the city of New York has made a new departure from the established custom of his predecessors, by making liberal use of the camera to secure pictures of defective work. Naturally enough contractors who have tried to increase their profits by doing their work in the flimsiest manner, without regard to the safety of human lives, are "down" on the new inspector. Our Canadian inspectors should lose no time in purchasing a kodak. It might also be possible by means of this little instrument for the Ontario Association of Architects to obtain some "horrible examples" of design and construction which would materially assist in bringing the Legislature to an appreciation of the reasonableness and necessity of amending the Ontario Architects' Act.

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MY attention has been called to the peculiar enterprise of a Montreal publisher. This gentleman recently issued the first number of a periodical for plumbers, the heading of which, if we except the one word "Canadian," is an exact fac simile of that of a New York publication in the same line. Anybody who imagines he is called upon to fill a long-felt want in the field of class journalism or any other branch of journalism, has a perfect right to make the attempt, but for the credit of the business and this Canada of ours, I protest that such persons should show that they have ideas of their own, and not purloin bodily the ideas of others either because of their lack of originality or because they desire by sailing under false colors to reap where others have sown.

THE COMPETITION EVIL.

AN architect forwards to us a copy of the document printed below, which he states is being sent out to architects both in Canada and the United States:

SAULT STE. MARIE, February 18th, 1897.

SIR,—You are hereby invited by the trustees of the Sault Ste. Marie Methodist Church to submit for their inspection plans and specifications for a church in said town, on the conditions that if your plans and specifications are accepted by the trustees, that you will be paid therefor the sum of one hundred dollars ($100); but should they not be accepted they will be returned to you at your own risk, and you will be entitled to no remuneration whatever.

The church to be built of stone which was blasted out of the lock-pit of the ship canal, and is consequently not uniform in size, as if it had been regularly quarried in the usual way. The outside course to be dressed and laid in the Broken Ashlar style on the front and two sides of church, the rear end to be built of hammered stone; church to have a seating capacity of at least 450 on the ground floor, exclusive of gallery or galleries in addition, and with basement underneath adapted and suitably arranged for Sunday School purposes.

The building with heating and seating complete not to cost more than $7,500, exclusive of stone and sand, which will be delivered by the trustees on building site outside of above amount. Full, ample and complete working details to be furnished with plans or specifications, or before the sum of one hundred dollars ($100) above mentioned is paid, and said sum of $100 is not in any event to be paid unless the trustees upon calling for tenders can secure a reliable contractor to undertake the building at the price named.

The church will be situated on the north-west angle of Spring and Albert streets, and will face towards south and also towards river, which runs east and west two or three blocks away; the natural depression of the lot and surrounding land is towards the south.

The plans, specifications and working details to be the absolute property of the trustees until the building is completed and all matters concerning same fully and finally settled and wound up, then to be returned to the party furnishing same at his own risk, but trustees not to be in any way responsible for loss or destruction of plans while in their possession. No plan necessarily accepted.

You are also requested to state, in case your plans are accepted, what amount you will take to superintend the erection of the building, and whether you would give same your personal supervision, and if not, what arrangement you would make therefor.

A similar communication to this is being sent to a limited number of architects, and you are requested to reply at once as to whether you intend to submit plans under above conditions, so that if you do not intend to submit plans the trustees can communicate with someone else in your place.

If you desire any further information the trustees will be pleased to furnish it.

W. H. HEARST, Sec. Com.

The gentleman who brings this document before our notice, writes: "I am not a member of the Ontario Association of Architects, and see no good reason for becoming such as long as prominent men in the Association residing in Toronto and other leading cities will allow themselves to be approached in such language and in such terms as are embodied in the enclosed. It has occurred to me that what I send you hints at a state of affairs that might well be placed before the Association."

Messrs. Smith Bros., of London, Ont., have removed to larger premises at 265 Dundas street.

The Asbestos & Asbestic Company, Limited, with a capital of £500,000, is being organized in London, Eng., for the purpose of developing property at Danville, Que.

WORDS OF ENCOURAGEMENT.

IN addition to the complimentary references by subscribers to the ARCHITECT AND BUILDER, which were printed in our February number, we have since received the following:

"The CANADIAN ARCHITECT AND BUILDER is a credit to the proprietor, being both artistic and very useful to all architects and builders. We wish you every success for the future."—MOORE & HENRY, Architects, London, Ont.

"I am pleased to say something in favor of the CANADIAN ARCHITECT AND BUILDER. I have been a subscriber for a number of years and have carefully marked its progress, which I consider has been in excess of my expectations. I find it very useful generally, and think that if all the materials going into a building were advertised in the paper it would still further enlarge its usefulness."—JOS. VENNE, Architect, Montreal.

"I consider your journal, the CANADIAN ARCHITECT AND BUILDER, a very useful medium amongst architects and builders for the exchange of ideas, practices and methods, &c., conducing greatly to the knowledge required by both architects and builders in every day work. The New Year number is good and excellently illustrated, and should be in the hands of every Canadian architect, builder and artisan. I understand somewhat the difficulties of the last ten years in introducing your journal, and have noticed the gradual education of the public in matters architectural, due in a great measure to the influence of your paper, and heartily wish you success in the coming years."—CORNELIUS J. SOULE, Architect, Victoria, B. C.

"I take it that, in addition to the illustrations, the interchange of ideas, theoretical and practical, between members of the profession, the object of a journal devoted to Architecture is to afford its readers some information as to where the appliances most needed in the building trades can be obtained. I consider this feature of primary importance, and if manufacturers only knew how the pages of trade journals are scanned by architects and builders living in out-of-the-way places, there would be a considerable increase in the number of their advertisements. The CANADIAN ARCHITECT AND BUILDER is doing a good work, and its influence should be spread to a greater extent than now obtains. This can easily be done if every architect and builder in Canada will send their subscription of two dollars each for the current year. The January number is an interesting one, and well worth perusal. It will bear comparison also in its make-up with any other architectural and building journal published in America. You have my best wishes."—CHAS. H. WHEELER, Architect Winnipeg, Man.

WORKS OF CONSTRUCTION.

A new hotel, known as the Arlington, has been completed at Tavistock, Ont., from the plans of Mr. D. G. Baxter, architect, of Stratford. The building is 47 × 44 feet, three stories high, with basement, of Romanesque design, and built of white brick with stone trimmings. The ground floor contains bar, dining-rooms, sample rooms, etc., well lighted and arranged. On the upper floors are eighteen large bedrooms and a ball room, and throughout the building is finished in polished hardwood. Safford hot water radiators are used for heating. The contractors were Messrs. Wilker and Wolfe & Quehl, of Tavistock. The interior furnishings were supplied by Messrs. Kalbfleisch & Krug, of Tavistock, and J. A. Duggan, of Stratford. The cost was in the neighborhood of $14,500.

THE new wing of the General Hospital, at Guelph, was formally opened last month. The addition was constructed from the plans of Curry, Baker & Co., of Toronto, and is a white brick structure, three stories high, with a frontage of 63 feet and extending back 83 feet. The cost, including interior fittings and permanent furnishings, was $20,000, and accommodation is provided for 30 additional patients. Adjoining a large solarium is a semi-public ward, and in the north end of the first floor are two private rooms which have been furnished for the exclusive use of the nurses. Besides these there are five private wards, pantry, kitchen, lavatory, baths, etc., while opposite the pantry is the electrical room, where apparatus is kept for medicinal purposes. The basement contains the heating and ventilating system. Two large boilers are used, one for direct and the other for indirect heating, the former being done by steam and the latter by hot air. A small boiler is also used for the heating of water for the baths and other purposes. In the basement are also four private rooms. On the second flat are several wards, and solarium, with a large maternity ward in rear. The feature of the third floor is the operating room, 18 × 26 feet, located in the north-east corner. Corrugated glass in the roof, and 88 incandescent lights provide ample light at all times. The nurse's private quarters are also on this flat.

LEGAL.

Joseph Ferry, contractor for the Giles avenue sewer, Windsor, served a writ on the city in an action for $3,000 damages for cancelling his contract. The case will be tried at the assizes.

Judgment has been given in the case of Henry Macfarlane vs. Chas. N. Armstrong, of Montreal. This case arose out of contracts in connection with the building of the Baie des Chaleurs railway. The plaintiff claimed the sum of $417,142.29, with interest thereon at eight per cent., alleging that by a contract entered into in June, 1886, between himself and defendant, the latter undertook the construction of that portion of the Baie des Chaleurs railway between Metapedia and Paspebiac, under the direction of the railway company's engineers. After completing some 40 miles of the route defendant suspended operations for want of funds. Mr. Justice Mathieu gave judgment for the plaintiff for $168,964.10, with costs and interest.

Judgment was recently given by Mr. Justice Walkem at Victoria, B. C., in the action brought by Mr. McDonald, contractor, against the trustees of the Pandora Methodist Church, to recover certain moneys alleged to be due him in connection with his contract. The plaintiff claimed a balance of $1,245 for excavating and completing the basement of the church, damages to the amount of $3,000 for alleged failure of the defendants to furnish him with suitable plans, drawings and specifications and delays on the part of the defendant in paying him as the work progressed, and $3,624.10 for alleged extras. In respect of the first claim the jury and judge found in favor of the defendants on the ground that there was no contract with the plaintiff for the work. Regarding the second claim, it was shown that defendants had originally made a contract with another contractor to construct both basement and superstructure of the church in brick, but subsequently decided to have the superstructure done in stone. Thereupon the name of the plaintiff in this action was substituted in the contract for the superstructure for that of the original contractor. The Court held that the plaintiff having thus assumed the contract, had consented to and was bound by its provisions. On this ground the jury and the Court found against the plaintiff's claim for damages for delays in furnishing necessary plans, etc. With regard to the plaintiff's claim for extras, the jury recommended the allowance of a number of items. On this point the judge remarked: "Building contracts, like all other contracts, have, according to a well known rule, to be construed by the Court; and as plans and specifications, when referred to in the contract, form a part of it, they are, of course, included in this rule. Hence the question of what are and are not extras in the present case, depends on the contract and the specifications, and is a question for me to determine; and even had I left it to the jury, their opinion, however sound, would have been inoperative. My object was to get their valuation of the work charged for, so that if the plaintiff should be entitled, according to the construction of the contract, to the benefit of any item so valued, I would be enabled to give it to him. Before dealing with each of these items, as I propose to do in their order, it may be useful to quote the first paragraph of the contract, which speaks for itself, viz.: 'The specifications and drawings are intended to co-operate, so that any works exhibited in the drawings, and not mentioned in specifications, or vice versa, are to be executed the same as if mentioned in the specifications and set forth in the drawings.'" The Court refused to allow a number of the allowances recommended by the jury on the ground that the work was specified either in the drawings or the specifications, and therefore came within the contract. In deciding the action the judge gave judgment for the plaintiff for $130 and for the defendants on counterclaim for $300. A portion of the costs were allowed to the defendants, as to the remainder each party to bear his own.

Mr. George C. Morrison, of Hamilton, Ont., has patented a hot water boiler. The claim is for a vertical boiler constructed with one tubular piece having threaded or screwed ends, and faced in combination with heads having inner true face to engage with ends of said boiler when screwed in position, with water inlet and circulating tube or pipe and water heating reservoir connected by means of pipes.

REPORT OF TESTS ON VENTILATION.

By the courtesy of the Chairman, Dr. J. J. Cassidy, of Toronto, we are enabled to publish the following valuable report of the Committee on Ventilation presented recently to the Ontario Provincial Board of Health. Embodied in the Report are the results of recent tests of ventilation in a number of public buildings in Toronto. In view of the importance of the subject we print the Report in full as follows :—

REPORT OF THE COMMITTEE ON VENTILATION.

It is a source of satisfaction to learn that in the State of Massachusetts the ventilation of public buildings and school-houses has passed beyond the theoretical stage. In that State statutes were passed in the year 1894 regulating the construction, ventilation and sanitary conditions of buildings, and it is the special business of the Department of the Inspection of Factories, Workshops and Public Buildings to see that the regulations imposed by those statutes are promptly carried out.

In a Massachusetts statute, entitled chapter 508, the following regulations are made :

"Section 40.—Every public building and every school-house shall be kept in a cleanly state and free from effluvia arising from any drain, privy or other nuisance, and shall be provided with a sufficient number of water closets, earth closets or privies for the reasonable use of the persons admitted to such public building or of the pupils attending such school-house.

"Section 41.—Every public building and every school-house shall be ventilated in such a proper manner that the air shall not become so exhausted as to be injurious to the health of the persons present therein. The provisions of this section and the preceding section shall be enforced by the inspection department of the district police.

"Section 42.—Whenever it appears to an inspector of factories and public buildings that further or different sanitary provisions or means of ventilation are required in any public building or school-house in order to conform to the reqirements of this Act, and that the same can be provided without incurring unreasonable expense, such inspector may issue a written order to the proper person or authority, directing such sanitary provisions or means of ventilation to be provided, and they shall thereupon be provided in accordance with such order by the public authority, corporation, or person having charge of, leasing, or owning such public building or school-house."

On printed form No. 83 the following requirements are called for in the heating and ventilation of school buildings in Massachusetts :

1. "That the apparatus will, with proper management, heat all the rooms, including the corridors, to 70° F. in any weather.

2. "That, with the rooms at 70° F. and a difference of not less than 40° F. between the temperature of the outside air and that of the air entering the room at the warm-air inlet, the apparatus will supply at least 30 feet of air per minute for each scholar accommodated in the room.

3. "That such supply of air will so circulate in the rooms that no uncomfortable draughts will be felt, and the difference in temperature between any two points on the same breathing plane, in the occupied portion of a room, will not exceed 3°.

4. "That vitiated air, in amount equal to the supply from the inlets, will be removed through the ventiducts.

5. "That the sanitary appliances will be so ventilated that no odors therefrom will be perceived in any portion of the building.

"To secure approval by the department of plans, showing methods or systems of heating and ventilation, the above requirements must be guaranteed in the specifications accompanying the plans."

Fully recognizing the wisdom of the above mentioned statutes and the propriety of the regulations founded on them, your committee, in order to ascertain whether the conditions of heating and ventilation in Toronto are conformable to the legal standard required in Massachusetts, examined the ventilation of three public school-houses, two Sunday school-rooms and the city police court. The following is the report of the work done :

REPORT ON THE VENTILATION OF TWO ROOMS IN THE CHURCH STREET SCHOOL-HOUSE, CORNER OF ALEXANDER AND CHURCH STREETS, TORONTO.

Date of inspection Dec. 17th, 1896. Weather overcast and mild. Wind south-east. Temperature 33.8 F. Humidity 61%. Barometer 29.85. This building is heated and ventilated by the Smead-Dowd apparatus. It is a twelve-room school, three stories in height, and there are four furnaces, one for each corner of the building, each furnace heating and ventilating three rooms.

Room No. 2, ground floor, s. w. side ; seating capacity 63 ; present 61 ; net air space 11,368.67 cubic feet ; air space per head 186.37 cubic feet ; temperature at teacher's desk 68 F.; humidity 49% ; difference in temperature in different parts of the room at the breathing line 5° F.; air supply at inlet 1,630 cubic feet ; air removed at outlet per minute (estimate) 1,630 cubic feet ; amount of air supplied to each pupil per minute 26.72 cubic feet ; air changed completely in 6.96 minutes ; carbonic acid parts in 1,000 of air 0.537 ; time of test 2.55 p.m.

Room No. 4, ground floor, n. e. side ; seating capacity 64 ; persons present 50 ; net air space 11,738.17 cubic feet ; air space per head 235.66 cubic feet ; temperature at teacher's desk 67° F.; humidity 55% ; difference in temperature in different parts of the room at the breathing line 3° F.; temperature of the air at the inlet 71° F.; air supply per minute 1,650 cubic feet ; air supply at outlet per minute (estimate) 1,650 cubic feet ; amount of air supplied each pupil per minute 30.8 cubic feet ; air changed in 7.14 minutes ; carbonic acid in parts of 1,000 of air 0.537 ; time of test 3.20 p.m. The fires were getting low, and the results obtained would probably show the average of all kinds of weather.

REPORT ON THE VENTILATION OF TWO ROOMS IN THE LOUISA STREET SCHOOL, TORONTO.

Date of inspection Dec. 18th, 1896; weather generally clouded; wind south; temperature 36.9; humidity 92%; barometer 29,389. This building is heated by box stoves in which wood is consumed. There is a fresh air inlet in connection with each stove, but the supply of fresh air is merely nominal, the ventilation being accomplished by open fanlights in the windows.

Room No. 1, ground floor, on the s. e. side ; seating capacity 45 ; persons present 40 ; net air space 11,636.25 cubic feet ; air space per head 290.90 cubic feet ; temperature at the teacher's desk 61° F.; humidity 60% ; difference in temperature at different parts of the room at the breathing line 13° F.; temperature of the air at the inlet (fanlight) 42° F. The fresh air inlets were two open fanlights, having an area of 6.72 square feet. The wind was blowing towards them, but as there was no definite inlet or outlet, I did not ascertain the amount of air supplied per minute or the amount removed. Carbonic acid in parts of 1,000 of air 0.806 ; time of test 11 a.m. It had begun to rain when the next room was tested.

Room No. 2, ground floor, on the n. w. side ; seating capacity 64 ; persons present 58 ; net air space 10,365.42 cubic feet ; air space per head 178.71 cubic feet ; temperature at the teacher's desk 59° F.; humidity 71% ; difference in temperature in different parts of the room 5° F.; temperature of air at inlet 42° F.; fresh air inlets, five open fanlights, representing 16.75 square feet ; carbonic acid in parts of 1,000 of air 0.615. As the fanlights were all open and the room was filled with fresh air, this cannot be considered a test of the ventilation of this room.

REPORT ON THE VENTILATION OF THE SHERBOURNE STREET METHODIST SABBATH-SCHOOL, TORONTO.

Date of inspection Dec. 20, 1896 ; weather very cloudy ; wind south ; temperature 30.9 ; humidity 59.0 ; barometer 29.561. This is a large room with galleries, formerly used as a church : seating capacity 350 ; persons present 250 ; area 65,920 cubic feet ; area per capita 263 feet ; temperature at the desk 64° F.; carbonic acid in parts of 1,000 of air 0.806 at the first test ; at a second test I found 0.537 ; time of test 3.30 p.m. This room is heated by a Smead-Dowd furnace. Fresh air is propelled through the furnace by a 48-inch fan, which is driven by an electric motor. The fresh air enters by eight inlets high up on the walls, and is extracted at the level of the floor, brought to a gathering chamber, and expelled by a 48-inch extraction fan. The extracting fan was said to be making about 200 revolutions per minute when I obtained 0.806 carbonic acid. It was said to be making 400 revolutions per minute when I obtained 0.537 carbonic acid. January 26th, 10.45 a.m., I tested the ventilation of the Sherbourne street Sunday-school, only two persons being present. Temperature at desk 70° F.; difference in temperature in different parts of the room at the breathing line 4° F.; temperature of air at inlet 100° F.; temperature of air at outlet 66° F.; area of combined fresh air inlets 8.50 square feet ; revolutions of propelling fan 160 per minute ; revolutions of extracting fan 160 per minute ; air propelled through inlets per minute average 520 linear feet. This multiplied by the area of the inlets, 8.50 square feet, equals 4,420 cubic feet per minute, or 17.68 cubic feet per head per minute for 250 persons. Air removed at outlets, 530 linear feet per minute, equalling 270,300 cubic feet removed per hour. This last sum, divided by the total area, 65,920 cubic feet, shows that the air of the room was being changed at the rate of 4.1 times per hour. Assuming that 30 cubic feet of fresh air ought to be supplied per head per minute, and that 250 persons were present in this room, we find that instead of receiving 7,500 cubic feet of air they would get 4,420 or 58% of the proper quantity. This probably accounts for the large amount of carbonic acid present in the air on December 20th. If the propelling and extracting fans were made to work more actively there would be no difficulty in introducing the proper amount of fresh air, although, in cold weather, it would take more fuel to heat the room.

REPORT ON THE VENTILATION OF THE CENTRAL METHODIST SUNDAY-SCHOOL, CORNER OF BLOOR STREET EAST AND PARK ROAD, TORONTO, DECEMBER 26TH, 1896.

Weather cloudy; wind south-west; temperature 30.2; humidity 71% ; barometer 29.945. The room is situated on the first floor and has a gallery ; area 70,000 cubic feet ; persons present 500 ; area per capita 140 cubic feet ; temperature at the desk 61° F. Two warm air furnaces supply the heating, and there are ten warm air inlets in the room, most of which discharge at the floor ; net inlets 7.81 square feet ; two outlets on the wall and two in front of the stage ; net area 1.51 square feet ; 650 ½-inch holes in perforated boards, placed in ceiling and connected with two outlet tubes, which escape through the roof ; net area 1.42 square feet. The ceiling ventilators were closed. No estimate of amount of air supplied ; carbonic acid in parts of 1,000 of air 0.806 at the floor ; in the gallery 1.61 ; time of test 3 p.m. The room was crowded, the doors were closed and the windows closed and darkened, as a magic lantern exhibition of scriptural subjects was being given at the time the test was made. On February 9th, 1897, I estimated the amount of fresh air which entered this room, the conditions as to heating and amount of outlet being similar to those obtained December 26th. The supply amounted to 70,260 cubic feet of fresh air per hour, or about one change of air in an hour.

REPORT OF THE VENTILATION OF THE TORONTO CITY POLICE COURT, COURT STREET, DECEMBER 28TH, 1896.

Weather cloudy and hazy ; wind south-east ; temperature 23° F.; humidity 99% ; barometer 30.259.

First floor, north side ; area 20,240 cubic feet ; persons present 165 ; area per head 122.50 cubic feet ; temperature at the desk 67° F. The room is warmed in cold weather by four steam radiators. Four circular pipes 6 inches in diameter enter the room about 13 feet from the floor. They are intended to act as fresh air inlets. There were two large outlets, each having an area of 256 square inches, one grate-flue having an area of 21 sq. inches, and another of a similar size which was bricked up. Two small windows near the ceiling were open. Three doors were open—two of them double doors opening on the main corridor near the head of the staircase, which starts near the street door. The third door opened into the magistrate's room. There was also in the centre of the room an open staircase leading from the ground floor, through which the prisoners ascended. The available area was thus very much larger than the figures given—20,240 cubic feet—would indicate. Carbonic acid in parts of 1,000 of air, first test, 0.537 ; after the three doors had been closed for fifteen minutes, the two windows and central staircase remaining open, carbonic acid in parts of 1,000 of air 0.806. February 6th, 12.30 p.m., I estimated the natural ventilation of the police court, the doors, windows, and the trap-door over the staircase being closed. Only two persons were present.

The discharge of air by the outlets was as follows :—

By 1 outlet	30,798.00	c. ft. per hour.
" 1 "	24,426.00	" "
" 1 grate-flue	1,828.26	" "
" 1 bricked-up flue		
" 2 cold-air inlets which acted as outlets	5,771.28	" "
Total air discharged	62,823.54	" "

The indraught of air was as follows :—

By 2 cold-air inlets	5,771.28	c. ft. per hour.
" loosely fitting doors and trap-door, and the spaces beneath the doors and around the windows (estimate)	57,052.26	" "
Total air introduced	62,823.54	" "

The amount of air introduced in an hour, 62,823.54 cubic feet, divided by the area of the room, 20,240 cubic feet, would show that the air was changed 3.1 times in an hour. Allowing 30 cubic feet per minute or 1,800 cubic feet of air per hour to each person present, such an area, doors and windows being closed, would properly accommodate 34 persons, each of whom would then have an area of 600 cubic feet.

REPORT ON THE VENTILATION OF A ROOM IN THE DUFFERIN SCHOOL, BERKELEY STREET, TORONTO, JANUARY 7TH, 1897.

Weather cloudy ; wind south ; temperature 27° F.; humidity 67% ; barometer 29.891 ; room 8, 3rd floor, east side ; seating capacity 58 ; persons present 49 ; net air space 12,163.83 cubic feet ; air space per head 284.24 cubic feet ; temperature at the teacher's desk 69° F.; difference in temperature at the breathing line over the greater portion of the room 1° F.; temperature of the air at the warm air inlet 128° F. Two window sashes were lowered at the top, one 8 inches, the other 5 inches. There was a large foul air duct in one corner of the room, the shaft of which was heated by steam coils. The available area of its opening in the room was 4.27 square feet. When the door and windows were closed 320.25 cubic feet per minute were removed through this opening, or 19,215 cubic feet per hour. Fresh air supply at the inlet, 600 cubic feet per minute or 36,000 cubic feet per hour ; amount of pure warm air supplied per minute per head, 12.24 cubic feet ; amount of foul air removed per head per minute through the ventiduct 6.53 cubic feet. When the windows were opened there was no current in the foul air outlet. The open windows acted both as inlets and outlets, but the amount of air introduced and extracted by them was not estimated, as the supply was irregular and capricious. Carbonic acid in parts of 1,000 of air 0.806 ; time of test 3.15 p.m. Remarks.—The warm air supplied was insufficient in quantity and of too high a temperature, so that cold air had to be introduced in an irregular fashion to supply the deficiencies under both these heads. Even with the open windows the supply of fresh air was small, as was proved by the amount of carbonic acid in the air. The high temperature of the warm air at the inlet, ranging from 120 to 150° F., made it difficult for pupils to occupy the corner where the register was situated. As the air of the schoolroom became superheated, the windows had to be opened, allowing a considerable waste of heat. This room is heated but cannot be ventilated unless the windows are opened.

Dufferin school is an 18-room school-house. Sixteen of the rooms are heated by steam pipes, direct and indirect. The indirect heating consists of pure air, warmed by passing over steam coils in a shaft situated in the basement, and introduced into the room by a register. In very cold weather direct steam coil heating is superadded. In each of these sixteen rooms is a foul air outlet, heated by steam coils ; net area of opening 4.27 square feet. In two rooms there are no warm air inlets, the heating being effected by direct steam coils. These latter rooms are provided with skylights, which may also be used as outlets for air. The combined outlets of the north wing of the building discharge through a large covered outlet about four feet above the roof of the north portion of the building. Similarly the combined outlets of the south wing discharge above the roof of the south side. Tested at the roof these outlets seemed to discharge a considerable amount of foul air ; but the test made in room 8, which is circumstanced in a manner similar to the other fifteen rooms, shows that these outlets remove only a small percentage of the foul air.

Your committee submit, that of the six buildings examined, the only one which could be considered as satisfactory in the matter of ventilation was the Church street school. In room 2 of this building there was slight overcrowding, and the amount of air supplied each pupil per minute, viz., 26.72 cubic feet, was below the standard. The difference in temperature in different parts of the room at the breathing line, viz., 5° F., was too great, but some of the thermometers were placed near windows. In room 4 the conditions were all quite satisfactory, the amount of air supplied per head per minute being 30.8 cubic feet; and the difference in temperature in different parts of the room at the breathing line 3° F.

At Dufferin school the heating was sufficient, if anything rather too high, but the supply of pure air at the inlet was defective, and was supplemented by the liberal use of windows.

At the Louisa street school-house, in room 1, the difference in temperature between different parts of the room was excessive, viz., 13°, and the ventilation, depending on the open fanlights, was draughty.

At the Sherbourne street Sunday-school the heating was good, but the supply of pure air was not sufficient. This defect could be easily remedied by making the fans work more briskly.

At the Central Methodist Sabbath school the heating was suffi-

cient, but the fresh air supply insufficient. The room was also overcrowded. Increased inlets and outlets, with the use of fans, would produce good ventilation in this room, but the heating would require to be changed to suit the new conditions.

The ventilation of the Police Court, with several doors and windows open, cannot be seriously considered. If doors and windows were closed, the room would be altogether too small for the large number of persons who assemble there every day when business is transacted.

For services rendered during the preparation of this report your committee desire to express grateful acknowledgements to Mr. W. F. Rutley, secretary of the Smead-Dowd Warming and Ventilating Co.; Mr. R. F. Stupart, Meterological Observatory, and Mr. C. H. Bishop, Superintendent of Buildiogs, all of Toronto, and also to Mr. John F. White, State Inspector of Public Buildings, Boston, Massachusetts.

Respectfully submitted,

J. J. Cassidy,
P. H. Bryce.

MANUFACTURES AND MATERIALS

STAINED AND PAINTED GLASS.

A lecture was delivered before the Women's Art Association of Montreal by Rev. Canon Norman on "Stained and Painted Glass." The two terms were not synonymous, he explained, though as a fact most windows were the result of a combination of both practises. White and colored glass was made by the ancient Egyptians at least 3,000 years ago. The Greeks and Romans also excelled in the manufacture of glass vessels, but do not seem to have known anything of glass windows. St. Jerome, in the 4th century, seems to have been the first known author who alludes to glass windows. Colored glass windows were apparently used in the 6th century. It is believed that glass painting took its origin in Limoges, and that the first artists were Venetians. The mosaic character of the very old glass suggests that it was modelled on the style of glass mosaics. The art was generally known as early as the 10th century, and the exact process of manufacture has not undergone material change since the 12th century. The lecturer described the tests for determining the date of any old painted window. He went through the history of the art in England from the 13th century to the recent revival. In the early days there was no attempt at perspective, the designs were conventional, but the colors were very rich. Much of this early glass was manufactured in Germany. France is very rich in examples of early glass. As time went on, the drawing of the design was much improved, and the same may be said of borders and canopies. But the quality of the glass began to deteriorate. The Renaissance period witnessed the golden age of painted glass, so far as mechanical execution went, but there was a marked falling off in reverence and devotional feeling. In England, soon after the Reformation, the demand for stained glass greatly diminished, and enamel coloring, discovered about that time, was freely introduced, and impaired the transparency of the glass. Deficient knowledge in the chemical combination of colors tended to produce failures in effect, and lack of permanence. The art in fact nearly died throughout Europe, until within the last 40 years. The revival on the continent owed its existence to the energetic skill of a French gentleman at Serves, and the revival in England synchronizes with the introduction of Gothic art. The lecturer next described the process of manufacture, which he illustrated by specimens, kindly furnished by Messrs. Spence Bros. He recommended, in the selection of a window for any church, that the aspect of the window should be taken into consideration, and the architectural details of the church, and he urged the beauty of stained glass as a decorative adjunct for churches and domestic dwellings. The artists of the present day far excel those of ancient days in their drawing, although they may not surpass them in their treatment of color.

THE DUTY ON CALCINED PLASTER.

The Albert Manufacturing Company, of Hillsborough, N.B., have submitted the following points to the Tariff Commissioners in opposition to a reduction of the present duty on calcined plaster:

"That the average price at mill, now obtainable for sales throughout Canada, is 86 cents per barrel of 300 pounds, from which has to be deducted back charges and interest where credit is given. Calcined plaster cannot be manufactured for less than 80 cents per barrel unless in far larger quantities than the present demand of the Canadian market represents. It is quite impossible to increase the present price owing to competition from the manufacturers of plaster in the states of Michigan and Ohio. A reduction in the duty on plaster from 45 to 40 cents, made at the last revision of the tariff, necessitated a corresponding reduction in price to points in most parts in western Canada. Further reduction would make the business unprofitable. The average cost to the consumer at this time is at least 35 cents per barrel less than before the imposition of protective duties, and the price obtainable is at least 25 cents per barrel less for the manufacturer. We would cheerfully welcome reciprocity in this article, and in conclusion submit that if any change be made it should be in the direction of increase rather than decrease in the present rate, no satisfactory reason having yet been given for the reduction above referred to. The manufacture of this article is important in the locality in which it is made, i. e., in the parish of Hillsborough, county of Albert, N. B. It also affords considerable freight for the Intercolonial Railway, total shipments over this road for the year 1896 amounting to 23,144 barrels, and if not discouraged would in time become a very important contributor in the way of freight to this railway."

The present sales of the company in Canada were shown to be 23,000 barrels. Last year 60,000 tons of plaster rock were shipped to the United States, and each ton of rock makes about eight barrels of plaster.

The McIntosh Granite and Marble Company, Ltd., is applying for incorporation, to acquire the business of D. McIntosh & Sons, Toronto.

Messrs. J. C. Spence & Sons, of Montreal, have executed a handsome stained glass window, for the chapel of St. George's Cathedral, Kingston. The window is being erected in memory of the late Wm. H. K. Macauley.

The Dominion Electric Heating and Supply Company, are applying for incorporation, to manufacture electric heaters and other electrical appliances. The capital stock is $100,000, and among the promoters are Thomas Askwith, contractor, and J. A. Trudeau, electrician, both of Ottawa.

Mr. Samuel Cabot, of Boston, has issued a handsome half-tone plate of the "Old Pierce House," at Dorchester, Mass., built in 1635. Mr. Cabot uses this old house as an illustration of the durability and value of eel grass as a preservative material, the walls of this old structure having been found to have been stuffed with this grass. This grass is employed by Mr. Cabot as an insulating material in his sheathing and deafening quilt.

THE BUILDER

[This department is designed to furnish information suited to the requirements of the building trades. Readers are invited to assist in making it as helpful as possible by contributing of their experience, and by asking for particular information which they may at any time require.]

Finishing Pine. If a room is to be finished in pine, and the wood to be left in its natural state—which is decidedly the best way to finish pine care should be taken that no oil, or grease of any sort, animal or vegetable, should touch it, nor should any of the so-called fillers be used, as they stain the wood, and so far as pine is concerned, do no good. The pristine freshness and beauty of pine can only be preserved by first finishing the woodwork with a plane very finely set, and avoiding all plane marks or other blemishes, and when the wood has been properly prepared and cleaned, done without using sand or glass paper, it should receive a coat of pure white shellac varnish, which, after drying, and being properly rubbed down, should be coated with two or more coats of transparent varnish, and rubbed down with hair-cloth to polish desired. Pine finished in this manner gives to either furniture or interior trimmings a handsome and desirable finish, that will preserve the grain and lustre of pine in all its mellow golden lightness.

Concrete. A concrete is used in France for building purposes that possesses the necessary qualities of solidity and hardness. It is composed of 8 parts of sand, gravel and pebbles; 1 part of common earth, burned and powdered; 1 part of powdered cinders and 1½ parts of unslaked hydraulic lime. These materials must be thoroughly beaten up together; their mixture, when properly moistened, gives a concrete which sets almost immediately, and becomes in a few days extremely hard and solid, properties which may be still further increased by the addition of a small quantity—say 1 part of Portland cement. It is stated that many large buildings have been constructed of this material in France in one case a house three stories in height, 65 × 45 feet, standing on a terrace, having a retaining wall built perpendicular 20 feet high and 200 feet in length. Every part of this structure was made of hard concrete, including foundations, vaults of cellars, retaining wall, and all walls exterior and interior, as well as the cornice work, mouldings, string courses, parapets and balustrades, and the building has no band iron in the quoins or other plan to bind it together. All lintels over doors and windows, and all sills, are composed of the same materials, being cast in moulds.

Windows and Doors. One of the most important features in an interior arrangement is the actual and relative height and width of doors and windows. The question is whether the apparent proportions of apartments cannot be greatly modified by the treatment of the necessary openings. A window in the center of one side of a room gives more light than if at one side of the center, but it has the effect of shortening the length of that side. The same is true of doors in similar positions. The higher a window is the more light it will give, but the lower a room will appear. In doors, nothing is gained by increasing the height beyond the regular proportion; sometimes, however, it may be necessary to keep a narrow door the same height as other doors in the same room in order to prevent an uniform appearance. Their relative height to that of the windows is a nice question of balance that can only be determined by the height of ceiling and size of room. Wall space to suit furniture often has to be considered, and when conditions will admit, it is often advisable to place two narrow windows in a wall, with the required space between them, than to put a large window in the center of the room. In the disposition of doors much can be done in the way of providing wall space by arranging closets and openings so that the desired results may be attained.

Stable Floors. For reasons that are obvious, a stable floor should be durable, not too hard or unyielding, impervious to moisture or vermin, adherent to the feet and not slippery, smooth and a non-conductor of heat. Wood is the most common material in use, and its cheapness, ease of working, and non-conducting qualities, go a great way to make up its want of durability. But there are several kinds of wood, and some are better than others for this purpose. The hardest woods are not the most durable, nor the most desirable. Three-inch basswood plank has made a more durable floor than one of three-inch white oak plank, and it was warmer, softer, and gave a much better footing because it wore shreddy instead of smoothly, as the harder wood did. This timber has many useful points about it, as it will stand rough usage and wear, and as we have plenty of it in Canada, it might be used more frequently for barn and stable floors than it is. Hemlock and spruce come next in this respect. But a plank floor is an absorbent of the urine, and soon becomes rank with ammoniacal odors. Then some process is required to make the planks water proof, this may be done by saturating the planks with hot gas tar, when the floor becomes a most desirable one for such stables as can not have a ground floor. For a plank floor of the best kind, it is best to lay the planking double, that is, the first floor of soft three-inch plank, which must be thoroughly soaked with coal tar, filling the joints well; then, while the tar is hot and soft, lay a two inch plank floor over, taking care to

break joints, and putting the plank as close together as possible, so that the tar fills the joints of the upper floor and overflows upon the top surface, which is finally well coated with tar. Seven and a half or eight feet will make the length of the floor required, and this should slope about two and a half inches to the rear. This short top floor gives a dry bed for the horse, and the drainage flows off from it to the lower floor, where it may be collected by a liberal coating of dry absorbents. The tar coating is apt to make a slippery surface, but this may be prevented by applying sand on it while soft.

Estimating Lath.

LATHING and plastering are usually estimated by the square yard. Local customs govern the allowance to be made for openings, closets, etc. In some localities it is the custom to deduct all openings, such as doors and windows. In other places half of the openings are deducted, while the custom in still other sections is to measure on all openings and figure them in. Closets presses, etc., would be figured in one place at their actual contents, while in another section of the country the surfaces would be doubled. To find the number of lath required to cover a square yard is a very simple matter. A standard lath is 1½ inches wide and four feet long, and consequently contains one-half of a square foot. It would therefore take eighteen laths to lay a square yard of surface if the laths were laid close together. As a rule, however, the laths fall short in width, enough to allow for the spaces which are left between them. Each bundle should contain 500 feet, or 100 laths. As some bundles fall short of this, and as there is more or less waste in cutting, it is necessary to make due allowance for this falling off, and to meet it, it is the just thing to allow when estimating twenty-one laths for every square yard to be covered. Experience has proved that this figure is the nearest possible to being correct.

Veneering.

IN these days, when native hardwoods are coming into general use for inside finish, it is necessary that the workman shall have some knowledge of the art of veneering, for such a thing as solid hardwood doors or sashes should not be permitted in a well finished house. Those workmen who have had any experience in veneering, are aware of the irritating difficulties that beset the new beginner when attempting to prevent the veneering side from going hollow as the glue sets; in fact, to prevent this is a very difficult job unless the workman is well up in his art. Many methods to avert the "hollowing up" have been devised, such as joining ends in several places, veneering on both sides, the one to counteract the other, and fixing before and after veneering. A good method, which has the two advantages of being simple and inexpensive, as regards material and time, is as follows: Prepare the heart side of the stuff to be veneered, then swell the other side by placing a layer of damp sawdust on it over night; it will then be in the morning quite hollow on the face side. Then size the face side, keeping the back damp until the size is sufficiently dry for the caul and veneer, when it will be found to be slightly round on the veneering side, and it may be kept so by placing the veneered sides of two piers face to face and clamping them up, and allowing them to dry gradually. Of course, after trying this experiment, it will not take long to be able to determine how long the material will require swelling; generally one night will be sufficient.

Bricklayer's Rules.

To make good brickwork the following rules should be observed: 1. Reject all mis-shaped, broken and unsound bricks. 2. Place all the beds of the courses perpendicular, or as nearly perpendicular as possible, to the direction of the pressure they have to bear, and make the bricks on each course break joints with those of the course below and above by overlapping to the extent of from one-quarter to one-half the length of a brick. 3. Cleanse the surface of each brick and wet it thoroughly before laying it, in order that it may not absorb the moisture of the mortar too rapidly. 4. Fill every joint thoroughly with mortar, taking care at the same time that the thickness of mortar shall not exceed one-quarter of an inch. In order to prevent the use of too great a thickness of mortar, it is usual in specifications to prescribe a certain depth which a certain number of bricks shall not exceed. For example, if the bricks are 2¾ of an inch thick, it may be specified that four courses of bricks, when built in the wall, shall not measure more than one foot in height, a condition that implies the average thickness of mortar in the joints shall be not more than one-quarter of an inch. 5. Use no bats or pieces of bricks except when absolutely necessary in order to make a "closure," that is, to finish end or corner of a wall, or the side of an opening, and even then no piece less than half a brick should be used.

Ground Floors.

GROUND floors for stables may be made in a variety of ways. The best are, no doubt, made of concrete, or of gravel and hot tar mixed, and laid down hot, or of Portland cement and sand, or of wood blocks laid down on end and saturated with hot tar. The first, second and third make exceedingly durable and solid floors, non-absorbent, non-conducting of heat, and are therefore warm for the animals, cool for the feet and wholly impenetrable by rats. The manner of laying down these floors is very simple, and with the exception of the tar floor, should be laid down the same as a cellar floor, with coarse gravel, broken bricks and broken stones as a first tier, three or four inches thick, well pounded down; on this a layer of regular concrete or cement should be laid, of sufficient thickness to meet requirements. The tar floor should first have a foundation of gravel, broken stones or bricks, laid down and well pounded to give it a solid start, on this should be poured grout, made of common lime cement, sand and fine gravel. When set hard and dry coat over with about an inch of coal tar sand and fine gravel, which must be spread evenly over the whole work. Whatever gutters or drains are required should be moulded in the floors as the work progresses, or a piece of timber, wrought to the shape required, may be laid down, and the floor built around it, and which may be taken up as soon as the work is done, and such repairs made to make the drain complete as may be apparent. For making a floor of blocks on end the earth should be removed to a sufficient depth, and a proper bottom prepared of broken stones, gravel or plank, the former being preferred. The blocks should be soaked in hot tar and laid as close together as circumstances will permit. When the whole surface is covered and the blocks

where the gutters are wanted sunk a couple of inches lower than their neighbors, the whole should be coated with a layer of hot tar and sand. If properly done the floor will last a lifetime, and remain sweet and clean.

Plaster for Mouldings.

WHEN walls and ceilings are to be heavily moulded some extra provision should be made for carrying the additional weight. This is sometimes done by driving spikes in the wood-work in a line with the projecting mouldings, allowing them to stand out far enough from the wall to carry the weight of all the "coarse stuff" and yet permit their heads to be covered entirely with the "fine stuff." Besides taking this precaution, some decorators use a "fibrous" plaster, with the object of securing greater firmness and tenacity. Longer hair is employed in making this mortar than is ordinarily used in making common mortar. In England and France, and to a limited extent in Germany, plasterers sometimes apply a coat of coarse mortar where the mouldings are to project, then let it dry; then lay over this a fine wire netting, which is secured to the wall or ceiling with nails or other appliances; then the work is finished over this. In some first-class residences the picture-frame moulding is formed of plaster, and when properly done such a moulding is superior in many ways to the gilded or finished wood moulding. The rough mortar used as a foundation for moulded work should be superior to that used on the wall or ceiling for straight plastering, and to insure this it should be well mixed and re-mixed, for it is impossible to mix mortar too much. A good proportion is to use one portion of lime and two and a half of clean, sharp sand and a proper quantity of hair, to which sufficient water should be added to make it workable. The mass should stand at least ten days before being used. It is better, if time will permit, to allow the mass to stand fourteen days before applying to the walls. The cracking of plaster, when not attributable to settlement or shrinkage, is often due to the fact that the mortar has not been properly mixed or has been applied in too "green" a state.

Hints to Paper-Hangers.

IN hanging paper where the room has been occupied for some time it is essential, if good work is desired, that the room be cleaned out, floor washed, and the walls washed down or well brushed; not a fly-speck should be left to be covered by the paper. The old adage: "Clean out the sides and corners, and the middle will take care of itself," holds good in the matter of preparing walls for papering. Perhaps in the whole art of decoration there is no department where cleanliness is so imperative as in hanging paper, and when work is commenced the workman should have at hand pumice-stone, a basin of clean water, a clean towel and a sponge, all of which should be in a position where they may be used whenever required. The best paper-hangers use a large round paste-brush, and eschew the flat brush used by men who are not well up in the business. It is claimed —and justly, too—that the round brush takes up the paste much more cleanly than the flat one, and that it can be turned by the hand when spreading the paste and thus prevent the paste from soiling the printed side of the paper. It also has other advantages, as it can be used in any shape it may be taken up, and can be worked dryer than the flat brush. It is conceded by all paper-hangers that all attempts to make paste from anything but the best wheat flour have resulted in failure; but it does not follow that all paste made from the best of flour is alike or adapted to all kinds of paper-hanging. A good paste for general purposes may be prepared as follows: For a room which will require about eight or nine rolls of paper, beat up four pounds of flour with cold water, but no more water at first than is sufficient to make a stiff batter; beat it a little, and small knots will not be formed; then add more cold water to bring it to pudding batter as used in cooking; add from one to two ounces of well-pounded alum. This amount of material, when mixed, will make paste enough to fill a patent pail about three-quarters full. Be sure to have more boiling water ready than that measure. Take it boiling hot from the fire and pour it gently but quickly over the batter, stirring it at the same time; and when it is observed to swell, and the white color of the batter is changed, no more water is required. This method, if closely followed, will give a paste that will be fine and smooth and very adhesive. For heavy embossed paper the paste should be made a trifle stronger by putting in it a little more flour, according to the weight of the paper to be hung. For cheap light paper of inferior grades a thinner paste may be used, though we would not recommend the use of inferior paste even if inferior paper is employed. If the walls to be papered are broken or uneven, the cracks or uneven spots can be made in the same plane as the walls by applying plaster of Paris to the defective places. Sometimes the projections, if not too prominent, may be rubbed down with the pumice-stone the paper-hanger always has on hand.

Fire Doors and Shutters.

THE best door to resist fire is the simplest. It should be made of pine and should be made of two or more thicknesses of matched stuff nailed across each other at right angles or at an angle of forty-five degrees. If the doorway be more than seven feet by four feet, it would be better to use three thicknesses of stuff; in other words, the door should be a thickness proportional to its area. Such a door should always be made to shut into a rebate, or made flush with the wall when practicable; or if it is a sliding door, then it should be made to shut into or behind a jamb, which should press it closely to the wall. The door and its jambs, if of wood, should then be sheathed with tin, the plates being locked at the joints and securely nailed under the locking with nails at least one inch long. No air spaces should be left in a door of this kind by paneling or otherwise, as the door will resist fire best that has the most solid material in it. In most situations it is much better to fit the door upon metal slides rather than upon hinges. This sort of a door may be fitted with automatic appliances, so that it will close of itself when subjected to the heat of a fire, but these appliances need not interfere with the ordinary methods of opening and shutting the door. They only constitute a safeguard against negligence. The construction of shutters varies from that of doors only in the use of thinner wood. All the other conditions are the same. Doors and shutters built after the manner described resist fire a dozen times better than the ordinary iron door, whether sheet, plate, cast or rolled, single, double or hollow, plain or corrugated. The wooden door covered with tin only serves its purpose when the wood is fully encased in tin, put on in such a way that no air, or a minimum of air, can

reach the wood when it is exposed to the heat of a fire. Under these conditions the surface of the wood is converted into charcoal; and charcoal being a non-conductor of heat, itself tends to retard the further combustion of the wood. But if air penetrates the tin casing in any manner, the charcoal first made, and then the wood itself, are both consumed, and the door is destroyed. In like manner, if a door is tinned only on one side—as we have seen some—as soon as the heat suffices to convert the surface of the wood under the tin and next to the fire into charcoal, the oxygen reaches it from the outside, and the door is of little more value than a thin door of iron or a plain wooden door.

PROMINENT CANADIAN CONTRACTORS.

I.

MR. RICHARD DINNIS.

We have pleasure in presenting to our readers as the first of a proposed series of sketches of prominent Canadian contractors, the accompanying portrait and particulars of Mr. Richard Dinnis, senior member of the firm of Richard Dinnis & Sons, Toronto.

Mr. Dinnis was born in Cornwall, England, Sept.

MR. RICHARD DINNIS.

18th, 1834. After leaving school he was apprenticed to Messrs. Oliver & Son, the largest contractors in Cornwall, from whom he received his indenture papers, which he now has. After receiving his papers he became head clerk and manager for the firm.

In 1856 he came to Toronto and entered the employ, as bookkeeper and assistant, of Mr. Pim, a well known builder of that time. He afterwards became general manager for Messrs. Worthington Bros., contractors, and with them in 1865 went to Ohio, U. S., to execute some large railroad contracts.

In 1866 he returned to Toronto and commenced on his own account the extensive business of which he is still the head. For many years Mr. Dinnis did a large business for the city in the construction of street roadways, wharves, etc., and during his long career in Toronto as a contractor has performed in a highly creditable and satisfactory manner the carpenter work in many of the best residences, warehouses and public buildings of that city. As the contractor for the large buildings for the Toronto Industrial Exhibition Association, he made an enviable record for speedy workmanship—the Main building having been completed in ninety days, the large Annex in forty days and the Grand Stand, 650 feet in length, in forty-two days. The firm have the contract for the carpenter work in connection with the new city buildings now nearing completion in Toronto. As an evidence of their excellent reputation, the fact may be mentioned that when in 1888 the Toronto City Council decided to invite new tenders for these buildings, the carpenter work was excepted, on the ground that the original tender of Messrs. Richard Dinnis & Son was "an exceptionally good one."

The subject of this sketch is a member of the Toronto Board of Trade and from his large experience is in frequent request as a valuator. In the midst of onerous business duties he has also distinguished himself in other fields, having taken an active part as a volunteer and held a lieutenant's commission in the 10th Royals, being likewise a prominent Freemason, last year having been elected District Deputy Grand Master of the Toronto district.

Mr. Dinnis is yet in body and mind a vigorous man, and it is hoped that for many years to come his active and useful life may be prolonged.

A MAIN TRAP AND ITS APPLICATION.

BY R. F. ELLIOTT, KINGSTON.

WHILE we have various forms and styles of sanitary traps, they are all made on the same general principle. As we understand a trap it is a sag, bend or partitioned chamber in a drain, soil pipe or sewer, arranged so that the liquid contents of same act as a seal to prevent the passage of back air or gases, but at the same time permitting the free discharge of liquids, solids and all waste matter. Where there is a connection between the sewer and the plumbing fixtures inside of any building, the most important feature with such connection is to prevent the entrance into the building of sewer gas. This can only be done effectually by placing what is termed the main trap at the foot of soil pipe before entering the main drain on the outside of building. This trap can be placed either outside or inside of cellar wall, but as close to said wall as possible, with proper provisions against the action of frost, and arrangements made for easy access for examination and cleaning out same should occasion require.

In this part of the country, on account of our severe winter, I have always advocated the placing of it inside the cellar wall. Thus I claim prevention before cure. Property owners have sufficient putrid matter as a factor of foul air from years' secretion on the internal surface of their waste pipes with the mechanical agencies applied, to prevent their passage through the fixtures in the form of traps, ventilators, etc., thus preventing the turning of private property into ventilating shafts for the public sewers, with all the attendant evils liable to enter the building through defects taking place in piping, fixtures, etc. Such defects are only too well known to the trade in general. Therefore, the main trap in question is the only safe sentinel always on guard to prevent any entrance of foul odors from the sewer into the building. It may be advanced that by placing a trap in the main drain we prevent the free ventilation of the public sewers by cutting off the free passage of air from the sewer and not allowing it to pass up through the main pipe for ventilation of the fixtures in the building. I would say in reply to this, that the sewers are public property, and any ventilating required should be carried on at the public expense, and not thrust upon private property owners. Again, when the occupants of buildings have discharged the decomposed refuse of organic or vegetable matter, it would be most detrimental to receive it back again in the form of disease, infected with sewer air and all its accompanying disease-spreading germs.

The only objection I have ever heard against this main house trap is its liability of being stopped up with particles of refuse which would otherwise pass away clear of any obstruction to the sewer. We must not forget that what might stop in the trap is just as liable to stop in the drain beyond, where means for its removal is more difficult than if it were retained in the trap. Not that alone, but the direct passage for waste matter to the sewer acts also as a conductor for the foul odors from the sewer through the house pipes, which greatly overbalances the benefits to be

derived from the much-claimed-for direct passage of waste matter to the sewer. The system of ventilation that some people advocate, having an unimpeded course from the sewer through the house vents to the outside air, should be ignored and condemned without any hesitation either in practice or theory.

The only proper system of ventilation for the soil, waste and drain pipes of any building is on the fresh air inlet system on the house side of the main drain trap, as circulation of air creates ventilation under any conditions where ventilation is required. The air cannot be too pure to effect such purposes. The best means I know of that can be applied, is to admit the outside air from a point, say about two feet above the ground, carried down to the foot of the soil pipe, and entering on the house side of the trap. The superior gravity of the outside air forces the confined air in pipes to circulate out of the orifice at the top of the main vent pipe, there to diffuse itself in the atmosphere, becoming harmless in its effects. The chances of stoppage in fixture traps are ten to one in the main trap, the reason for such being that as a rule water closets have, at the most, only ten to fourteen inches fall before reaching the trap seal, which is claimed in the main trap to be an obstruction. On the other hand, we have in sixty to seventy cases out of one hundred, from five to seven feet fall before reaching the main trap. In most instances the chances for cleaning out stoppage in fixture traps are more difficult than in the main trap. Over-flows in fixture traps are liable to do ten times more damage on upper floors of a building than an over-flow through the fresh air inlet at its base, which is the true indicator that the main trap in question calls for immediate attention. This is not the case with fixture traps until the damage is done, provided there are fixtures in the basement. Over-flows in basements are not fraught with such dangerous or annoying results as if happening on upper floors. They act as direct indicators to stopped-up drainage, which should be attended to at once.

Where can you place a better fixture to remedy the evil more quickly than by having the main trap to begin investigation after examining fixture traps? If they are found to be all right, there is no other fixture so useful for any purpose as this much misrepresented main trap. I can see great benefits to be derived from this system of house drainage, and the only grievance seems to be that plumbing or sanitary work, with its plumbing inspectors and sanitary laws, rules and regulations, should be condemned, and be, instead of a progressive element in our midst, a thing of the past. After many years of practice and theory, are we to wait until the thinking lawyer and householder, who in early days would see to it that he had a cement or other trap fixed in in his house drain to prevent the foul odors permeating his dwelling, commences over again to see that it is to be done, or are we expected to know of these requirements, and to recede from our plain duty by ignoring that which we know is a prime necessity. In connection with our imperfect drain and sewer systems, I believe we should not recede from that which is right; the task is before us in all branches of business, in all mechanical callings, and we must endeavor to advance with rigid rules determined to protect the health and lives of the community who place their confidence in us.

From many years of practical experience with main traps, I have yet to meet with any difficulty or serious complaint sufficient to call for anything but the highest praise for this—the most perfect system of sanitary plumbing known at the present time. Nor do I know of an instance where once this system was properly introduced, and its principles explained, that it has ever been removed. Ventilation, or the thorough circulation of air under various conditions, is what creates or conducts in direct connection with the sewer, and, run out above roof of building, causes a removal of the pipe air only under some favorable conditions. The forcing of the confined air to ascend occurs only when the sewer air is colder and of greater gravity than the pipe air, and the external atmospheric conditions at and above the earth's surface are favorable to assist the confined pipe air to discharge at the orifice of the main vent pipe above the roof. The condition above stated, as a general rule, is present to assist the upward motion only during the heated term of the year. In winter weather, when the sewer air is much warmer than either the outside air or confined air in house pipes, the reverse or descending motion takes place. If sufficient heat is generated in the sewer to put in motion the air confined in the conducts or vent pipes, the only favorable time for downward motion is when there is a heavy atmosphere prevailing at and above the earth's surface. Being subjected to various changes on account of wind, rainstorms, etc., in place of a direct circulation taking place, the air in pipes becomes dormant and stagnant and moves in neither direction, only being distributed a little when a large quantity of water sufficient to fill the pipes is discharged suddenly into the fixtures. We must apply as an agent some remedy to destroy or set in motion this stagnant air in house pipes and remove it, if possible, from the building, with all its dangerous elements always at hand to enter the dwellings of our people through any defects which may happen to exist. As sanitarians it is our duty to prevent, not to cure. The physician's duty is to cure if he can, and he must take and be content with second place.

In conclusion let me point out that the most important feature in connection with the system which I have tried to place before you is the fact that we admit fresh air into the soil pipe which causes circulation to constantly take place, morning noon and night, and removes foul odors from all house drains and connections.

PRESIDENTS OF CANADIAN PLUMBERS' ASSOCIATIONS.

MR. THOMAS CAMPBELL.

THE Master Plumbers' Association of St. John, N. B., was organized about two years ago, and now includes on its membership roll every plumber in the city. The present officers are Thos. Campbell, president; J. H. Doody, vice-president; Peter Campbell, secretary. It is our privilege to present on this page a portrait and brief sketch of Mr. Campbell, who has so ably occupied the president's chair.

Mr. Campbell is a native of St. John. He was

MR. THOMAS CAMPBELL.
President St. John Master Plumbers' Association.

apprenticed at an early age to learn the plumber's trade in that city, completing his instruction in Boston, where he spent some years. He commenced business in St. John some twenty-five years ago, and at all times has kept up with modern improvements in steam-fitting, hot water heating and plumbing. He is now engaged in fitting up the new High School building, now under construction, with the Sturtevant blast system of steam, driven by fans through galvanized iron piping. He has also just completed the heating apparatus in the new Vanwart block on Duke street.

Mr. Campbell was asked a few weeks ago by the Queen's Jubilee Committee to take part in the coming celebration as one of the very few survivors of the old volunteer fire department, of which he was one of the first and most prominent members, having been foreman and engineer of No. 4 company between the years 1850 and 1860, when the foremost men in the city were enrolled as fire-fighters, and when a fire department maintained at city expense was unknown.

As president of the Association for the past two years, Mr. Campbell has proven himself to be well qualified for the position, and has always shown a disposition to advance in every way possible the calling in which he is engaged. He claims that plumbing and its attendant branches have taken great strides in scientific improvement in New Brunswick of late years, that St. John architects are very particular as to specifications, and in no part of Canada, not even in its largest cities, can be found a higher standard of work.

DECORATIVE PLASTER WORK.*

AMONG the subsidiary arts with which the architect has to deal there are few of more general application or importance than that of the plasterer. So much of our construction nowadays is of necessity concealed, and plaster is so handy a means of concealment, and indeed, when rightly used, so excellent a one, that its use in the interior of buildings is inevitable.

It is a material so sympathetic and lending itself so easily to decorative treatment and the repetition of ornamental design, that a vast amount of decorative plaster-work—good, bad and indifferent, and I fear the last two adjectives are fully entitled to qualify two-thirds of the work—is being daily done. There is no one of us can well escape its use even if he wishes to do so. It therefore behooves all of us who have to do with building and decorating to consider and to learn what can and should, or what cannot and should not, be done with plaster-work, and it is much more with a desire to direct the attention of the younger members of my audience to some of its uses and abuses, than with any hope or intention of giving technical instruction, that I venture to appear before you.

One of the first considerations that borders the subject of plaster-work is that of its fatal facility—which constitutes a great decorative danger. Its comparative cheapness, its possibilities of rapid workmanship, and the endless and easy opportunities of reproduction that it affords—in a word, its immunity from the natural and powerful restraints that cost and structural necessities impose in most other building materials—seem to me in the case of plaster-work to render self-imposed restraint and careful discrimination more than ever necessary in the designer.

We are all of us, unhappily, familiar with the incontinent cornices of amazing horticultural suggestions, with their basket-work and lattices, their vines and passion-flowers insecurely supported by internal wires, which bedecked the chief chambers of our fathers. We all know, and none of us, I hope, love, the weirdly confectioned "centre flower" with dependent "gasalier" that formed the cherished ceiling ornament of the British householder in the fifties, the sixties, and even the seventies, and dropped, in intermittent fragments, into his tea-cup or his soup-tureen. So fearfully and wonderfully made, so all-pervading were these adornments, that they begot a natural nauseau in time, a nausea that—as often happens in such cases—communicated itself in mental connection to the innocent material that they vulgarized, causing sober folk to forswear ornament of any kind in plaster-work, to find a safe and wholesome refuge in absolute negation, absolute plainness. This was, of course, only a partial revulsion, and was accompanied or followed by "revivals," as they are called, of many types in plaster-work, as in all architectural design. The beautiful ceilings and friezes of the seventeenth century, which made our country famous for its plaster-work; were studied to good purpose by the very few, to evil by the very many, and "Elizabethan" and "Jacobean" travesties became nearly as rife and rampant as the exuberance of the centre-flower period. "Revivals" of Italian, French, Saracenic—indeed, of all and every bygone manner, have been practised, and there are many eminent plaster-shops where you can buy a "reach-me-down" design in imitation, superficially correct, of any style you please at so much—the term is apt—"per superficial foot." These things have had a great vogue with the uninstructed. They please because they offer a romantic suggestion of a possibly romantic original or of the manorial or seigneurial appurtenances of romantic fiction; a suggestion only, for even as copies they are poor, with their dead, level floated grounds, their railway line rigidity of "run" mouldings, their sharp arrises and mechanical "repeats." What a contrast they offer to the originals they travesty. Anyone who examines, with the eye of discernment, a good seventeenth-century English ceiling, will see that, beautiful as the plan of design and forms of ornament may be in themselves, they only count for a portion of the total sum of beauty. The hand of time and recurrent coats of whitewash have often done much in contribution of effect, but the intrinsic, ineffable, underlying charm of handiwork, of human pleasure and interest, of "handling" is there.

The plain surfaces are not hard and level, they are full of slight undulations, the ribs or "strap-work" have no mechanical rigidity, they are by no means accurate at their intersections, they are softly and pleasantly moulded, and usually undulate somewhat with the uneven surface of the ceiling.

The ornamental foliations, bosses, roses and the like—when they repeat, do not do so with regimental exactitude; awkward corners caused by irregular wall lines, chimney-breasts, etc., are lightly and nonchalantly dealt with; there is no strained attempt at fit, begotten of the drawing-board; the design is curtailed, expanded, chopped off or twisted to meet the emergency in a manner that would look queer on a smart office drawing, but is delightful in reality.

Experts differ very much as to the methods of preparing the plaster used for these old ceilings, and as to the way in which they were put up. It is, of course, well known that some were rendered in lathing, some on rough withies and some on reeds or rushes. It is obvious that casting was employed in many instances for the ornamental foliations and bosses, and it is stated that a sort of stamp or pressing-mould was employed for repeating ornaments of small size, such as the roses in the beautiful ceiling at Chastleton, one or two of which I was able to examine closely, as they had fallen down. They certainly seemed to me to have been squeezed into a mould. There are many indications that a good deal of the rib-work was formed by pressing into the plaster ceiling, while still damp, lengths of rib in a similar damp condition. One finds awkward joins and curious failures to fit to a centre, in the case of radiating ribs, which warrant that idea.

If you examine a fallen bit of plaster from one of these old ceilings, you will generally find it very thick and coarse, often very earthy, and sometimes full of little bits of gravel, etc., the kind of stuff the conscientious architect would have to condemn. But its very coarseness helped the effect of the plain surfaces by giving them texture—a quality we so often miss nowadays. How the elaborate and complicated ceilings were designed and set out we do not know with certainty, but there was probably a rough plan, which was all that a well-skilled workman needed—he had his tools, his models and his traditions. That he had models of ornaments for ceilings and friezes we know, as we find exact repetition not only in different rooms of the same house but in different houses. And you will often find ornamental designs, obviously intended for a ceiling, formed into a frieze or used to decorate the spandrels left between the horizontal frieze and the end of a vaulted ceiling, as in the library at Merton College, Oxford. It is probable, however, that much if not most of the decorative design was modelled in situ on the ceiling itself, partly with tools, partly with fingers.

When fingers were used upon the actual plaster it is obvious, as any plasterer will tell you, that the lime used cannot have been as sharp as that we use now—it must have been old or deadened, or no man's fingers would stand it.

There are many lessons to be learned from the abundant examples to be found in almost every county of England of beautiful old plaster-work, while Scotland, Wales and Ireland have their characteristic examples, and one of them is the extreme importance of plain surfaces of texture. I am glad to know that within the last few years that lesson has been seriously taken to heart by one or two artists who have turned their attention to plaster-work. There were some striking instances of the fact in the work of Mr. Ernest Gimson at the last Arts and Crafts Exhibition—work full of charm and feeling and quiet originality, and delightful in uneven surfaces, roughish texture and broad unlabored modelling—work as different in spirit from the average mechanical plaster-work of to-day as was that of the Elizabethan or Jacobean plasterer. I believe that the first essential of success in plaster work of frieze or ceiling is the treatment of the ground. It will be difficult, but necessary if we are to succeed, to wrest from the modern workman his ideal of perfect, even-floated and set levels, innocent of the faintest undulation as fresh thin snow over a sheet of ice, and looking just as cold and hard. It is amazing with what skill a good and conscientious plasterer, armed with his float and straight-edge, will arrive at that result. It is neat, it is smart, it is difficult to do, and he is proud of his achievement, and I do not blame him; he does well what is expected of him, and satisfies his conscience, we will hope. When his ceiling is to be sub-divided by ribs, or decorated with ornament of any kind, he still appears to be ruled by the instinct for sharpness, hardness and rigidity. He starts with a billiard-table surface, the "ribs" are run with a zinc mould in situ, or are cast in a "run" reverse mould and put up subsequently, the ornaments are cast from sharp feelingless models, and the work reaches a wonderful perfection of mechanical accuracy, which, to the mind of an artist, is its glaring imperfection. The arrises are sharp as razors, the beads are round and smooth as glass tubes; a correspondence religiously exact is maintained on both sides of a centre line.

* Abstract of a paper read at the Architectural Association on January 15 by Mr. E. Prioleau Warren.

The cornices are run as accurately, as mathematically as the rest, and the drawings and details are faithfully observed. The result is naturally as unsympathetic as the method. I speak of the average. I am well aware that, fortunately, there are exceptions—I am happy in believing that they are many, and the number seems likely to increase rapidly as architects increasingly devote more time and thought to what is one of the most interesting and important crafts among the many that they rule. What we need, it seems to me, to fit us for a more competent control of plaster-work, as of so many crafts, is to draw less and model more. Fortunately, within the last few years, a good many sculptors of talent have turned their attention to decorative plaster-work, and beautiful ceilings, friezes, and panels in low relief stand to the credit of several men whose names are well known to you. There is an increasing demand for decorative work in plaster. People, even of moderate means, are no longer generally content with the blank white lids of the boxes they live in. This discontent is exemplified in many ways, one of them is that suburban joy, the patterned ceiling paper; other indications are the patent substitutes for modelled ceilings, whose illustrated catalogues, with their alluring titles, are lavished in the letter box and waste paper basket of every architect. A desire for decorative friezes is also prevalent, and is exemplified by precisely similar instances. If this discontent is responsible for many queer results and unlovely makeshifts, it is not in itself ignoble. It is our business to divert it into wholesome channels. The instinct to enrich the ceiling or the roof is, I think, a natural one—the roof is surely as worthy of adornment as the walls. In a church or a great hall it is, or should be, the crown and glory of the whole scheme. In domestic work, in the home of the average comfortable Briton, the cheap substitute for modelled plaster-work obtains a readier acceptance on account of the fact that we dwell—most of us—like hermit crabs, in other people's shells. The leasehold condition of our occupancy has begotten a leasehold type of decoration. The householder wants something that will "last my time, don't you know"—or, at any rate, suffice for seven, fourteen or twenty-one years. So he not unnaturally shrinks from permanency, which implies cost, and he thinks the real thing costly; but, as a matter of fact, it is by no means necessarily so. With care and thought, and a little ingenuity, it is possible to get good decorative results in plaster at small cost. There are many ways, for instance, of redeeming the absolute bareness of a plain plaster ceiling, without much expenditure. You can have a well-moulded cornice, and divide your ceiling into plain panels by means of shallow ribs. At very little extra cost, if your design "repeats," you can put some simple little ornament into the panels. You can dispense with ribs, and have ornamental corner-pieces and a centre; or you can have the general field plain, and have an ornamental border next the cornice, and modelled in low, broad relief. Where your conditions make it possible, and, I should say, in a longish room or corridor, you can drop the cornice a little way down the wall, and form your ceiling to a shallow curve. This may be delightful in itself, even if quite unrelieved, or can be very effectively decorated with light ribs at intervals and simple flattish ornaments. There is really no end to the simple and effective possibilities of very slightly decorated ceilings. I have seen an old ceiling in a low room at Oxford which has four corner ornaments and a centre, very simply modelled in a highly conventionalized grape vine design—and it wants nothing more—but the plain surface is such as would horrify the skilled plasterer of to-day.

The ceiling under an ordinary collar-rafter roof frequently gives a pleasant opportunity for plaster decoration. You can accept the splayed side between ceiling and cornice and treat it as a sort of sloping frieze, ornamenting the flat under the collars more simply and sparsely, or you can fix out and form a curved or vaulted ceiling, as I have suggested before; and a vault is one of the most delightful fields for decoration.

When cost is not a closely restrictive consideration, the range of possibilities is wide—for ceiling, frieze, decorative panels on chimney-breasts, or such like positions, or for the treatment of the walls themselves. It is sometimes desirable—in a hall or a ball-room for instance—to treat the walls with a permanent architectural decoration that precludes further adornment by means of pictures, wall-papers or hangings, and this, if you use low relief and have a good protective base or dado, can well be done with plaster-work by means of pilasters, decorated panelling, reliefs, etc.

If pilasters are used, it is generally advisable to enclose the plaster relief in a wooden frame for preservation's sake. Whatever the field of your decoration, it is necessary, of course, to use restraint, to avoid overcrowding and fussiness, to aim at a broad decorative result, to remember that you will cheapen your devices by over-repetition and spoil your ornament by over-elaboration. The eye wants some unornamented spaces to rest upon. It seems to me in most cases wise to have rather plainly treated walls and a simple freize, for instance, where your ceiling is elaborate, and a simple ceiling where you want an elaborate frieze. It is hardly necessary to say that your plaster-work should be "plastering" in effect, round and soft, and should not imitate the treatment of any other material.

The ceiling, frieze, panels, or whatsoever form the plaster-work may take, should fall into the architectural scheme of the interior they contribute to; they must be in coherent relation to the rest. The scale must be preserved. And there are many considerations to be taken into account in designing a frieze or ceiling. The proportion of the room, of course, first. It is obvious that the same design would be inappropriate, in one instance, if applied to two rooms, one of which was 10 feet high and the other 20 feet, and that a long low room needs different ceiling treatment to a high square one. Then the lighting must be taken into account. Where the tops of the windows reach nearly to the ceiling, and especially where a longish room has such windows pretty evenly distributed along one side only, very delicate relief will tell at a considerable height. In the same room, if the windows are low, or so small as to give inadequate light, the relief will require to be bolder in order to tell. A room lit from two opposite sides, giving a strong cross light, is the most difficult to treat successfully. The cross light defeats the shadows and spoils the effect of relief; in such a room greater emphasis, greater sharpness of modelling, is advisable. All these remarks are intended to apply to daylight effects, but artificial lighting should be considered too. In great reception rooms, chiefly used at night, and in all rooms intended to be brilliantly lit—say by electric light—it is well to keep the relief rather softer and more delicate than in rooms of more ordinary character in illumination.

As a general rule, in an averagely lighted room, up to 13 feet or 14 feet in height, the relief of ceiling mouldings or ornaments does not require very great projection if the ceiling is left white or nearly white, as relief looks exaggerated. Ribs, I think, are but rather broad and shallow in form, and with a tendency to round members rather than sharp-arrised ones. Their size, of course, must depend upon the scale of the room, the heights at which they occur and the effect aimed at. Constructional beams dividing the length of a ceiling frequently help the design greatly, and are capable of very effective treatment in themselves. In many a splendid old ceiling the ornament was confined entirely to the beams and the cornice with which they intersected.

When there are no beams I am personally inclined to prefer detachment between the decorative design of the ceiling and the cornice. I like a margin left along the cornice. This helps you if you wish to leave the ceiling whitish and to color the cornice; and, generally speaking, the cornice must be regarded as the crown of the wall and not as the beginning of the ceiling.

However, that is, after all, a matter of design or circumstance; it is risky to generalize too freely. But it is safe to say that too much attention cannot be bestowed, first, on the ground surface—whether of ceiling, frieze or panel—and second, on the modelling of any ornament, whether simple rib or foliated or arabesque design. If you cannot be sure of getting good modelling have none at all, find safety in plainness. If you wish to avoid sharpness and hardness have ribs and cornices modelled, not run. Keep them simple and broad, not liney and wiry. Generally speaking, I believe that for ceilings a more or less geometric basis for the leading lines gives the happiest effect; the arrangement should, at any rate, be ordered, if not formal. But whatever the basis and whatever the treatment, the design should essentially be a ceiling design, the ornamentation of a flat surface—to be seen from below—and in a room where it is intended to be seen from all points it should "read," as it is called, in all direction equally well, though it may have a main longitudinal or lateral tendency. It is, perhaps, hardly necessary to counsel the avoidance of any obviously unsuitable type of design for a ceiling, such as swags and festoons—suitable, perhaps, on a vertical surface like a frieze, where the sense of vertical dependence is appropriate, but inappropriate and awkward in a ceiling. A frequently effective treatment for a tallish frieze is to have some form of ornament repeated at widish intervals, the interspace being either quite plain or filled with a plain moulded panel.

I have dealt so far with the consideration of plaster-work for

the interiors of private houses. Great mansions and great civic buildings differ in degree rather than in kind from these, and, as regards their internal plaster-work, the principles applicable to smaller buildings apply to them. Where deep-beamed and coffered ceilings are used greater structural support is needed for them, and bolder modelling and moulding, of course, to preserve their relation in scale to their architecture. They often, however, present the decorative problem of the treatment of domes, of which in a civic building I have not yet seen a strikingly original treatment in plaster-work. I have seen, you have all doubtless seen, dozens of domes treated with diminishing coffered panels, whose framework ascends on the converging radial lines. Wren left us many fine instances of these.

It has been reserved for the last few decades of this century, and the devotees of the "Gothic Revival," to find that plaster-work is inappropriate to the interior of a church. In the seventeenth and eighteenth centuries, and until near the end of the first half of the nineteenth, plaster ceilings were the rule and not the exception in churches.

A great many very charming ones have disappeared before the hand of the restorer, but several seventeenth and numberless eighteenth-century examples remain. I am glad to see that plaster-work is regaining its place in church interiors; it provides, at any rate, a pleasing variant to ceilings of stained or painted deal, or to open roofs with timbers or small scantling and wrought "die-square." For the enriched ceiling of sanctuary chancel or side chapel, I think it is a most excellent material; and the Invention of fibrous plaster makes it possible, with little difficulty and comparatively small cost, to use enriched plaster-work, not only for ceilings, but for other decorative purposes in churches.

The slabs of plaster which bear portions of the design, or completely fill separate panels, are put up like woodwork and screwed to the rafters or firring pieces put to receive them. Each slab should be composed of thinnish plaster, embedding layers, usually two in number, I believe, of very wide-meshed canvas, the plaster being worked well through the meshes. They are stiffened with laths or battens and can be worked to any required angle or curve. If the relief is not great they are very light. Where a number of slabs have to be joined to form a ceiling without intermediate ribs, it is customary to pack damp canvas between their meeting edges, which not only protects them, but forms a stiff setting when it dries; the fissures are subsequently pointed in with plaster. Brass screws should be used for fixing and the screw holes, of course, must be stopped in. If steel screws are used, the heads require to be coated with Japan or paint to prevent the inevitable rust from staining the plaster.

The use of fibrous plaster enables one to escape the flatness and rigidity I have spoken of as due to floating surfaces and running mouldings. The casts bear the direct impression of the modeller's handling. The use of this material is not without its artistic dangers, the chief of which is that its modelling is not as a rule done upon the actual ceiling. It is possible, of course, to model in situ, and then cast from the models elsewhere, and that, I fancy, would be one of the safest ways in which to prepare the design of a fibrous ceiling, for nothing can quite come up to the actual position and the actual lighting of the building for which the work is destined. The next best method is to arrange your model in the workshop at as nearly as possible the height that the ultimate casting will occupy, approximating as far as possible the conditions of light and surroundings, and modelling the ceiling from below. If you can manage this, it is wise, at least, to get your model either conveyed to the site it is to occupy, or hoisted up to some similar position for your judgment of effect.

It is essential in case of a ceiling with a cornice and divided by plaster ribs to have cornice and ribs cast from models also, not run. In the case of ribs this can be efficiently done by casting a reverse from the first model and pressing the clay into it to form ribs for the model section of the ceiling. The laying of the moist clay ribs into the ground surface of the model insures the avoidance of rigidity. I have said that it is impracticable to mould with the fingers the actual plaster so as to avoid casting altogether, unless that plaster differs very much from what we generally use. But that difference is now obtained, as I am told, by the use of old or deadened lime and some special kind of sand, and ceilings and other decorative work are modelled in plaster and in position. That, it seems to me, must be the best plan possible when the object is to avoid repetition and when cost admits of it; further, where exact repetition can be avoided the better will be the result.

I have now only a few words to say as to the treatment to finished internal plaster-work. When the plaster—fibrous or otherwise—is perfectly dry, it can be treated with a thin coating of wax dissolved in turpentine, wiped or rubbed here and there with a rag; this gives it a pleasant, soft, ivory like appearance that is more agreeable than the even tint of distemper. (At Groombridge I had the shields and emblems entirely gilded, and then glazed over partially with oil color, the whole of the remainder being waxed). If heraldry is employed the coats of arms must, of course, be colored, or the blazonry is incomplete. There are some good instances of the effect of emblazoned coats occurring in a general field of toned white plaster in the cloisters of Corpus College, Oxford. It is a contrast of which I am fond, that of richly toned heraldry and toned white plaster-work. In church work it is likely that color over the whole surface of the work may be needed, and this presents no difficulties either in the case of oil color or distemper; in the latter case the suction of the plaster will probably need to be stopped with a coat of priming. I referred just now to the effects of a cross light. In my opinion a ceiling lit from both sides requires color, and perhaps gilding, more imperatively than one lit from one side or end only, when the relief gets its full value through shadows.

Plaster reliefs may, of course, be readily used for decorating wall spaces or arch spandrels in churches.

There is, in fact, no end to its decorative applicability.

Time, and your patience, would fail me if I endeavored to cover all the ground of my subject.

You will notice that I have omitted all consideration of sgraffito work and scagliola, which certainly come under the head of decorative plaster-work; I did so advisedly, for the former subject alone would readily fill the limits of a paper like this.

MONTREAL PLUMBERS' DINNER.

The master plumbers of Montreal gathered together on Monday, the 1st inst., for their annual banquet, which was held at the Richelieu Hotel. Together with their friends, the company numbered over one hundred. The president of the Association, Mr. P. J. Carroll, presided, having on his right the Acting Mayor, Ald. Dupre, Ald. Beausoliel and Jacques, Messrs. T. Collins, of the Standard Manufacturing Company, F. Martineau, M.L.A., and A. A. DuMond; and on his left Mr. J. Lamarche, president of the National Association, Ald. Grothe, Messrs. Hy. McLaren, Colonel F. Massey and L. A. Mongenais.

After the bill of fare had received due attention, the toasts of Her Majesty and the Governor-General were acknowledged with the usual honors, and Mr. Carroll, in a pleasing speech, proposed the toast of "The National Association of Canada." Mr. Lamarche, in responding, spoke of the good the Association was doing, the benefits derived from being united for mutual protection, the necessity of maintaining the good feeling at present existing between the wholesale men and the plumbers, and the cultivation of a feeling among the journeymen that the interests of the master plumbers were theirs also. He referred to the relation of the plumber to the public, their calling being the one supplying the prevention and the profession of the doctor furnishing the cure to those that did not adopt the former; everbody knew the relative value of these, a case of sixteen to one.

"The Corporation of Montreal" was proposed by Mr. Jos. Thibault, and responded to by Acting-Mayor Dupre, Ald. Beausoleil, Jacques and Grothe.

"Our Guests" was proposed by Mr. W. A. Stevenson and responded to by Messrs. Hy. McLaren, of the Toronto Radiator Company; Col. Massey, of Gurney-Massey Company; Alex. A. Robertson, of the James Robertson Company; Wm. Robertson, of Warden King & Son; J. H. Wynne, of H. R. Ives & Co.; L. A. Mongenais, of the Star Iron Company, and A. A. DuMond. "Our Absent Friends" was proposed by Mr. W. M. Briggs in his usual happy manner, and Mr. E. C. Mount responded. "The Ladies," proposed by Mr. J. W. Harris, evoked a pleasant and witty response from Mr. John Watson.

During the evening Messrs. Briggs, Giroux and Wynne entertained with songs. The success of the banquet is largely due to the energetic work of the committee, of which Mr. Martin was chairman and Mr. Dennan secretary. Mr. Carroll proved an efficient presiding officer.

WINDSOR PLUMBERS ORGANIZE.

An association of master plumbers has been organized at Windsor, Ont., through the efforts of Mr. Wm. Smith, of London, vice-president for Ontario. The first officers are: Geo. M. Christie, president; Robert Paddon, first vice-president; H. Meadows, second vice-president; Jas. Pennington, secretary-treasurer; James Purser, sergeant-at-arms; representative to master plumbers' convention, Mr. A. Brian. The firms who have entered the association include Messrs. Morton & Christie, Pennington & Brian, L'Hereux Bros., Robt. Paddon, M. B. Squire, H. Meadows, R. Purser & Son, all of Windsor, and Watt & Son, Chatham.

Messrs. W. J. Burroughes & Co., Toronto, have removed to more convenient premises at No. 13 Adelaide street West.

The plumbers of St. Catharines, Ont., have organized an association, with Mr. Albert Chatfield as presiding officer.

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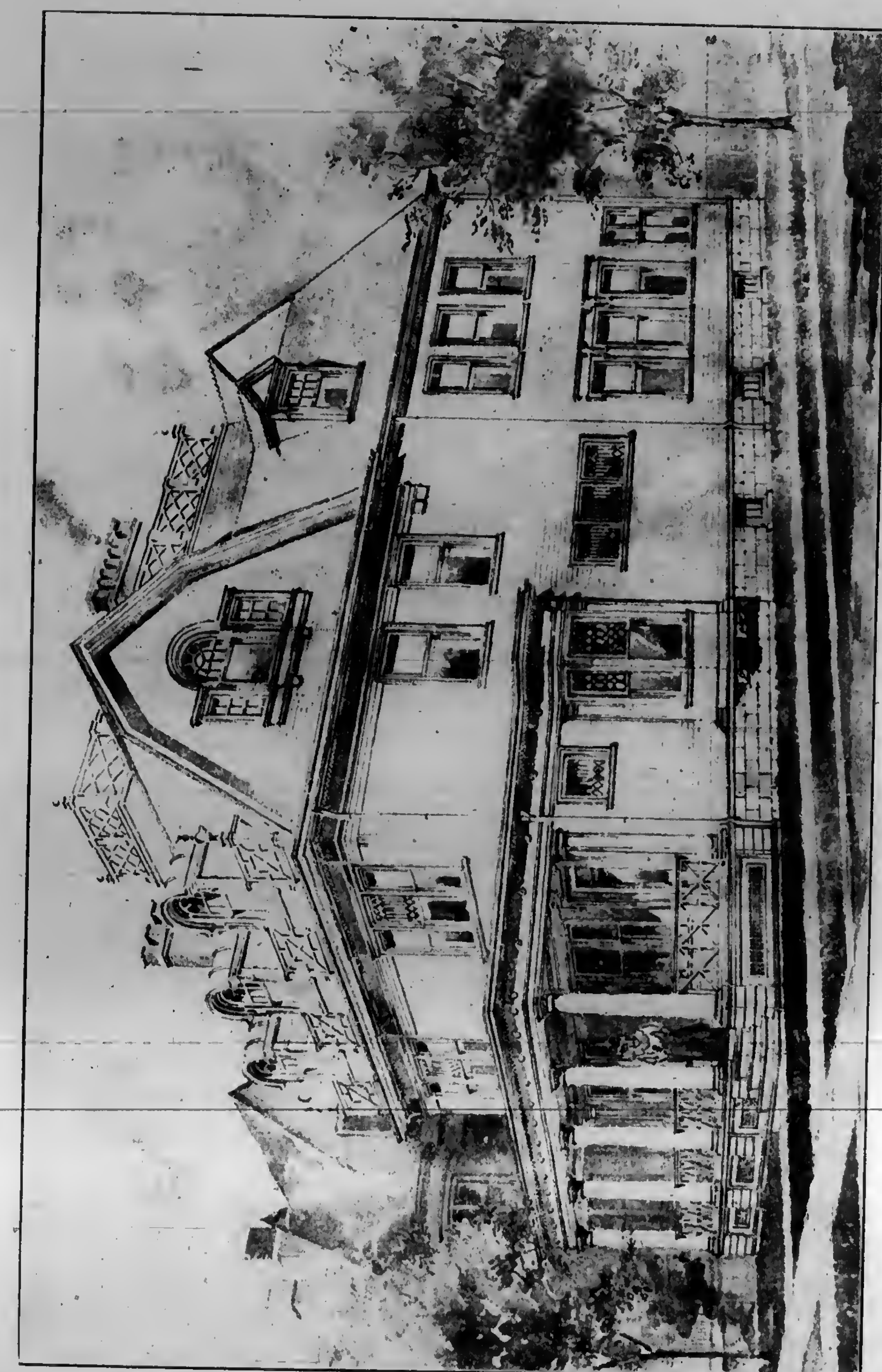

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A New Danger. THE theory has been propounded, and from its reasonableness, has met with considerable favor, that the settlement of the east wall of the Masonic Temple building at Chicago is due to the jar caused by frequent and abrupt stopping of the elevators, sixteen in number, which are ranged along the greater part of the extent of this wall. It is contended that these elevators, more particularly when descending, act as weights suddenly applied. This action in the case of a building of extreme height, erected on defective soil like that of Chicago, would seem to be likely to have an injurious effect upon the construction.

Disintegration of Surface of Brick. IT is quite a common thing to see the appearance of brickwork marred by scaling of parts of the surface of the bricks. In northern climates such as that of Canada, this scaling is often the result of expansion due to the action of frost—especially in the case of porous, soft-burned bricks, which easily absorb water. Other causes assigned are: Lime in the clay of which the brick is composed; want of care on the part of the manufacturer in connection with the damp course, resulting in the accumulation of moisture behind the surface of the brick; and the presence in the brick of hard pellets, the rate of expansion of which differs materially from that of the other constituents. If the clay is properly pugged while in course of manufacture, few of these mischief-working pellets will find their way into the finished article.

Architectural Competitions. REFERRING to the expose', in our last issue, of the methods which are being adopted by public bodies in Canada to secure from architects plans for public buildings at a fraction of their legitimate cost, we observe that a case of much interest to architects is now before the American Courts. A competition was instituted for designs for a county court house at Passaic, New Jersey. The building committee obtained the services of Professor Ware as expert adviser, and owing to this fact a large number of architects of good standing entered the competition. The committee, evidently with the object of favoring local architects, disregarded the recommendation of their adviser and awarded prizes to competitors whose designs were not considered by Professor Ware to be entitled to rank above the second or third class. The architects whose designs were selected by Professor Ware have entered a joint action for damages in the

Courts, and it is probable that should an adverse decision be given in the lower Courts, the case will be carried by appeal to the Court of highest resort. The architectural societies of the United States are very properly being urged to support the architects who have entered this action and contribute to the costs, in order that the rights of architects in competitions may be legally established.

Retirement of Mr. Thos. Fuller. THE news of the retirement of Mr. Thos. Fuller from the position of chief architect of the Public Works Department, was received with regret by all who enjoy that gentleman's acquaintance. This regret is intensified by the fact that his superannuation allowance has been fixed at a much smaller sum than he is entitled to receive. When Mr. Fuller accepted the position of chief architect, it was with the understanding that whenever he should be superannuated, ten years would be added to the period of his occupancy of the position, and his allowance calculated accordingly. This agreement was made in accordance with section 4 of appendix No. 2 of the Act respecting the superannuation of persons employed in the civil service of Canada, which reads as follows :—

"The governor in council may, in the case of any person who entered the civil service after the age of thirty years, as being possessed of some peculiar professional or other qualifications or attainments required for the office to which he was appointed, and not ordinarily to be acquired in the public service, add to the actual number of years' service of such person, such further number of years not exceeding ten as is considered equitable for reasons stated in the order-in-council made in the case ; and such additional number of years shall be taken as part of the term of service on which the superannuation allowance of such person shall be computed ; and the order-in-council in any such case shall be laid before Parliament at its then current or next insuing session. 46 V. c. 8, s. 3."

Unfortunately for Mr. Fuller, no written or printed record was preserved of this condition of his agreement, and notwithstanding the fact that Sir Hector Langevin, who was Minister of Public Works at the time the appointment was made, has written a letter vouching for the fact that such was the nature of the understanding between Mr. Fuller and the government of that day, the present authorities refuse to recognize the agreement. Under these circumstances Mr. Fuller will be forced to bring the matter up in Parliament, where it is to be hoped the justice of his claim will be recognized.

A New Method of Cleaning Iron. IN New York and at the Brooklyn Navy Yard, tests have recently been made of the application of the sand blast for the purpose of cleaning iron prior to painting. The apparatus used consisted of a Blake blowing engine and receiver for compressed air and a sand mixer with flexible pipes connecting to the receiver and a working nozzle. The engine was operated at 100 lbs. pressure from the boiler of a road rolling machine. The gauge showed a pressure of from 18 to 20 lbs. of air. The air at this pressure was forced through the mixer and, taking up the fine natural sand therein contained, forced it through a 2½-inch hose thirty feet in length and ¾-inch nozzle upon the surface of the iron at a distance of about six inches from the iron. By this method a steel column was cleaned at the rate of nearly two square feet per minute, one-tenth of a cubic foot of sand being used per square foot of surface cleaned. By the same method 25 square feet of the bottom of an iron vessel in the Brooklyn Navy Yard was cleaned in about six minutes. The estimated cost in the case of the New York test, on a viaduct, was from three-quarters of a cent to one cent per square foot. It is thought that this might be considerably reduced by reducing the amount of scaffolding. The sand blast is said to remove paint, etc., without having any appreciable effect on the solid steel, the surface treated being cleaned of every particle of paint, rust, grease, etc., and the metal being left bright and clear, exposing even the cavities, irregularities and pitting, and edges of cracks and joints being penetrated beyond the limit of accessibility by the brush. The method is said, however, to be very destructive to stone, brick, cast iron, or other crystalline substances.

Canadian Cement. WE are pleased to observe that the Dominion government recently awarded a contract for 20,000 barrels of Canadian native cement. The quality of both the native and Portland cement manufactured in Canada has been proved beyond question, consequently no satisfactory reason can be given for the large yearly purchases of foreign cement which have hitherto been made by the government for use in Dominion public works. Because of the partiality thus shown for the foreign article, the Canadian cement manufacturing industry has to a large extent languished and proved unprofitable. An English contemporary, the Builders' Reporter, in discussing this subject in a recent issue, has obtained an entirely wrong view of the situation, and in consequence, makes improper deductions, as follows : "Canada has to depend mainly on imported cement. During the year 1895, out of 255,000 casks which were used no less than 223,000 casks were imports. England supplies about 45 per cent. and Belgium 25 per cent. Up to March, 1866, the duty was 20 per cent. of the value, now it ranges from 33 to 52 per cent. In some cases the duty is found to exceed the cost of the cement. In consequence, an immense quantity of inferior cement is employed in Canada, and ordinary mortar is substituted for cement. Protection may have its advantages in a country like Canada, but if within a few years bridges on railways and roads and other public works can no longer exhibit sound masonry, the cost of repairs will be more than an equivalent for any gain derived from an excessive tariff. If Canada cannot produce cement there is no native industry to be protected, and therefore, for the sake of a fiction, the country is saddled with the expense of upholding a kind of construction that would not be tolerated in Great Britain." Our contemporary is entitled to pardon for having assumed that the large importations of foreign cement were due to the fact that Canadians did not know how to manufacture the article in a satisfactory manner. The large extent to which foreign cement has been used in our public works would naturally convey this impression to the mind of an outsider. There is, however, no ground for the conclusion—on the contrary, recent tests have shown the home-manufactured article to be superior in some instances to the imported one. We are pleased to see that the present Dominion government has shown a disposition to recognize this fact. There is abundance of the requisite material in Canada for the manufacture of both native and Portland cement. As the result of experiments carried on for a number of years, the requisite knowledge of methods has been gained, and if assured that the merits of the home article will in future receive fair consideration, we have no doubt that the number and capacity of the Canadian manufactories in this line would be increased to the extent necessary to meet all the demands of the market. This, in turn, would lead to further investments of capital in the industry, larger employment of skilled and unskilled labor, and the circulation at home of the large sums of money which have hitherto been yearly sent abroad to purchase the product of foreign manufactories.

The Canadian Architects' Bill. THE Select Committee of the Legislature to whom was referred the Bill to amend the Ontario Architects' Act, have reported thereon as follows : "The Committee have carefully considered the Bill to them referred, and having heard the opinions of several persons for and against the Bill, feel compelled to report against its provisions. Several suggestions were made by way of amendment to the Bill, looking towards elevating the educational standards of the Architects' profession without increasing the present powers of exclusion, and looking rather to an adoption by Collegiate or Governmental machinery of a curriculum and examination for admission. The Committee desires to express no opinion on these subjects, deeming the session to be too far advanced for their proper treatment, but prefer to leave the whole subject, so far as the educational side is concerned, wholly unprejudiced by the present action of the Committee, which has relation only to the Bill as it stands." The Architects' Bill is coming to be regarded as an educational measure, which it precisely is, and on this ground it received the support of the Trades and Labor Council of Toronto. It is possible that the government may see fit to submit a measure of this character at the next session of the Legislature, but there is at present no foundation for a definite statement as to future action on the part of anybody in the direction of endeavoring to improve the educational standards of the coming generations of architects. The Ontario Association of Architects have certainly labored long and earnestly for this object, and earned the thanks of the students, whose welfare was the mainspring of their efforts.

AYLSWORTH VS. ROWAN.

THE suit of Aylsworth vs. Rowan, which recently came before the County Court at Toronto, possesses some points of interest for architects. To give the facts of the case without printing the evidence in full would be somewhat difficult, and might inflict injury upon one or both parties to the suit. We will therefore refer briefly to some of the principal points brought out. The suit was entered by Mr. M. B. Aylsworth to recover from Mr. T. A. Rowan the sum of $200 for the preparation of preliminary sketches for a pair of houses. The parties to the suit were brought closely together by business dealings, and the evidence submitted by the plaintiff was that he had prepared sketches at the solicitation of Mr. Rowan, who intended to build in the near future, but who at the time had no property. These sketches remained in Mr. Rowan's office for some time, but were finally returned to Mr. Aylsworth. It was claimed on the part of the defence that Mr. Aylsworth prepared the sketches entirely on his own responsibility, with the hope that they would be adopted in case Mr. Rowan decided to build. In support of this claim it was argued that defendant was not at the time in a position to build, and, not having any property, would not authorize an architect to make plans for a house. The evidence was somewhat contradictory, and the jury returned a verdict against the plaintiff. A strange ruling in connection with the case was that the court refused to accept the entries which Mr. Aylsworth had made in his books regarding the work—in fact, he was not permitted to refer to them in any way. The judge, in his address to the jury, while not recognizing the tariff of fees as adopted by the Ontario Association of Architects, nevertheless based the sum to be charged for the work thereupon, and instructed the jury, in case the decision was in favor of the plaintiff, to bring in a verdict for the amount asked. The evidence submitted proved beyond any reasonable doubt that the practice of preparing plans without any definite understanding as to payment therefor was altogether too prevalent in the architectural profession, and also that of late years it has become the custom of some architects to submit sketches on speculation without solicitation, in the hope of inducing persons to build and to adopt the same. This latter fact rather prejudiced the case of the plaintiff in the above action. Some years ago, in case of a dispute between architect and client, the production of the plans was usually considered ample proof that the architect had received instructions to draw the same, but these conditions have now been changed by the keen competition to obtain commissions. In view of the above facts, we cannot too strongly urge upon architects the wisdom of obtaining written instructions before proceeding with the preparation of plans, thereby removing the possibility of a dispute or misunderstanding. The desire of architects to obtain work has no doubt in the past caused them to evade as far as possible the mention of terms to their client, fearing that by so doing they might lessen their chances of being employed. As every architect expects to receive remuneration for his services, he should have the courage to state in a business-like manner the sum to be charged for the work. The method adopted by some architects, and which we commend to the consideration of all, is, after receiving instructions to prepare plans for a certain building, to write a letter to the client indicating the sum to be charged under different conditions—for instance, a fixed sum for carrying out the entire work, and in case the building is not erected, the charge for preliminary sketches, plans, specifications, etc. By this means legal suits might be avoided, which are unprofitable to the participants and disparaging to the profession.

The Toronto Guild of Civic Art has been incorporated by the Ontario government, with a capital stock of $2,000. The object of the guild is to promote and encourage art, to arrange for the execution of works of art by competent artists to be chosen by competition or otherwise, and to hold exhibitions of architectural and stained glass designs, mural decoration, etc. Among the promoters are Messrs. Frank Darling and W. A. Langton.

In India a composition is often employed for protecting the stucco and plaster work exposed to the weather, consisting of 3 parts of linseed oil boiled, one-sixth of its weight of litharge, and 1 part of bees' wax. The surface to be treated must be perfectly dry and clean before the mixture is applied, which should be laid on hot with a brush.

"CERAMIC STONE."—The name of "Ceramic Stone" has been given by M. Garchey, a French inventor, to a new building stone obtained by him from broken glass. The glass—broken bottles, window panes, etc.—is reduced to powder, different kinds are mixed if a variegated color is desired, and the pulverized material is devitrified by passing successively through two furnaces, the second one being of high temperature. The pasty mass is then passed under a press, which gives it shape and consistence.

GOTHIC ARCHITECTURE IN NORTHERN ITALY.*

By A. C. Hutchison.

To understand Gothic architecture as practised in Northern Italy during the thirteenth and fourteenth centuries, and to be able to judge of its successes and failures when compared with the architecture of the same period as practised north of the Alps, it is essential that we understand the architectural environment of the Italian people.

As early as the latter half of the seventh century a style of architecture made its appearance at Pavia and elsewhere in which features of construction and design mark it as distinct from the debased Roman architecture previously practised.

Owing to the disturbed condition of the country during the dark ages the new style made little progress, and it was not until the eleventh century that buildings of importance in the style were erected, but during the eleventh and twelfth centuries it held complete sway in every part of Northern Italy except in Venice, which, from its insulated position and intimate commercial intercourse with Constantinople, sought its architectural inspiration from the east rather than from the west.

One other exception to the universal practice of the style is the Church of San Miniato in Florence, and in some other buildings in that locality, where we find a return to a more classical style.

As this style was the immediate predecessor of the Gothic, and as some of its features were adopted by the Gothic architects, it will assist us in our study of the Gothic style of Italy if we briefly glance at some of its more prominent characteristics.

Before the advent of the Gothic style all the architecture practised, not only in Northern Italy but also north of the Alps, was characterized by the use of the round or semi-circular arch, but though this important feature was common to the architecture of Italy, France, Germany, England and Scotland, each country employed it in such manner and in conjunction with other features, as to give to it more or less of a national character. The national character of this round arched architecture, while strongly marked, particularly in Germany and England, was, if possible, more marked in Italy, where it was practised in a style entirely different from the contemporary style as found on the north of the Alps.

The round arched style which prevailed throughout Northern Italy before the introduction of the pointed arch, is known as Lombard architecture, not that the Lombards who had established themselves in the land about the end of the sixth century had any architecture or produced any style of their own. They were, however, great builders, and there is little doubt that in the erection of their earlier buildings they employed native workmen who, knowing no other style than debased Roman architecture, would work in that style; but gradually under Lombard influence new features were introduced which in course of time produced the style to which their name is given.

During their sway, which extended over a period of about two centuries, the land was studded with churches and baptistries erected under the auspices of their kings and queens.

Nearly all the buildings erected by them during the seventh and eighth centuries have disappeared; a few, however, remain as examples of their work, the more notable being San Michele of Pavia, San Friediano of Lucca, and San Ambrogia of Milan.

The Baptistry of Florence, it is claimed, was erected during the Lombard dynasty, but if this was the case it does not possess the characteristics of the style that marks the buildings I have named.

From the few examples of the early Lombard style which remain to the present day, we can see the change in the proportions of columns and piers; the introduction of wild and grotesque imagery in their ornamentation of capitals and walls, that mark the style as distinct from the Roman.

During the two centuries which followed the rule of the Lombards, Italy was in such a disturbed and unsettled condition that little or no progress in art was made, the erection of churches ceased and only buildings required for defence were undertaken. During this period Genoa and Venice, somewhat apart from the scene of strife and rising in importance as maritime powers, were able to proceed with erection of buildings. In Venice, towards the end of the tenth century, the erection of the well-known St. Mark's was begun. Owing to the intimate commercial relations with the East, Greek architects were employed, with the result that in this city of the sea we have an independent development in architecture of a complex character that marks it as distinct from that of Italy.

As the development of the early architecture of Venice is foreign to my subject, I will pass it by, and returning to the mainland we find that the darkness which had enveloped the land during the ninth and tenth centuries began to break and give place to a new era of activity in building. During the eleventh and twelfth centuries a number of buildings were erected superior in size and skill in construction to any that were built during the time of the Lombard rule. These buildings are marked by the leading features which characterized the early Lombard buildings, but in addition we find new features introduced that gave the style a step in advance and prepared it for the advent of the Gothic.

An examination of the work of this period will show that the uncouth and grotesque carvings which characterized the early Lombard buildings has given place to figures and groups in low relief of somewhat better workmanship but still crude in design.

The most conspicuous feature that marks the buildings of this period is one that stamps the Italian character upon the round arched style as practised in Italy, and serving to separate it distinctly from the contemporary architecture north of the Alps. This distinctive feature of Italian buildings was the piling of tier upon tier of decorated arches differing from each other in design, and occupying the whole facade of the building to its very summit. The most notable examples of this arrangement are to be found in the churches of Lucca, but one that is better known to most travellers is the facade of the Duomo of Pisa.

Another feature introduced at this period, which always found favor with the Italians, and which they continued to practice during the whole of the Gothic period, was the use of material of different colors in the construction of the walls and piers; sometimes it was applied to the outside of the building, sometimes to the inside, and sometimes to both outside and inside. Usually the polychromatic effect sought for was obtained by the use of marbles or stones of different colors arranged in alternate courses.

I might mention other features that characterized the later Lombard buildings, and which, adopted by the Gothic architects, influenced them in their designs. These features I will be better able to describe when the views of the buildings are projected on the screen. It was not until the first quarter of the thirteenth century had passed away that the pointed or Gothic style made its appearance in Italy, and when it did make its appearance in the first building erected in the new style—that of San Francesco at Assisi—we find it complete in its forms and details as then practised in the North. It appears that when the erection of the building to receive the mortal remains of the great St. Francis was determined upon, there was no architect of celebrity in Italy, and Elias, the favorite disciple of St. Francis, to whom the work was entrusted, obtained the assistance of a German architect named Jacobus. It was only natural that he should recommend and use the style of architecture then practised in his own country, with the result that in the crypt and in the interior of the upper church we have a style of architecture quite distinct from anything that preceded it in Italy. It is true that long before this time the pointed form of arch was frequently used as a constructive feature in the architecture of Sicily; its use there was no doubt owing to the influence of Saracenic art, which, along with Byzantine and Norman architecture, produced a strange combination that gives so much interest to the mediæval buildings of that island. Though the pointed arch was thus used in Sicily, it did not in any way affect the architecture of Northern Italy; as I have already shown, it was introduced from north of the Alps. As soon, however, as it obtained a footing in Italy, it supplanted the earlier round arched styles, and the Italian architects were obliged to conform to the new style.

From the fact that it was an importation from a foreign country, and was in a sense imposed upon the Italians whose love for the round arched styles was deeply rooted, it follows that we cannot in Italian buildings trace the gradual development from the round to the pointed arch as we can in France and Germany; and more particularly in England, where in many buildings we may mark the first use of the pointed arch in conjunction with the round arch. The struggle for supremacy between the old round arch and the new pointed arch in England was protracted, with the result that between Norman Architecture characterized by the use of the round arch and the massive proportions of its piers and arches, and the Early English period when the pointed style was supreme, we have a well defined transitional period that affords a most interesting study.

In Italian architecture there is no such transition period; when the Gothic was introduced it at one supplanted the Lombard style, and though the Italian architects never hesitated to use the round arch in connection with the pointed when it suited their purpose to do so, there is no building that I know of in which the change from one style to the other is defined as it is in buildings in the north.

* Paper read before the Province of Quebec Association of Architects.

As already remarked Gothic architecture was an importation; the pointed arch which is the basis of the style was not an Italian invention, and though used by them, the possibilities of its use (except in a few buildings) were not developed as we find in the buildings of the north. This is not to be wondered at when we consider the environment of the architects of the Gothic period in Italy—on all hands they were surrounded by the remains of Roman architecture, with the result that classic thought and design was never dead, but only slept, and was ever ready to assert itself in some feature or design, or in the appropriation of ready-made materials of ancient buildings.

The designers of the cathedrals north of the Alps were under no such influence—they knew nothing of classic art, and pursued the practice of the Gothic, working on without a suspicion that any other style existed.

As an illustration of this, I remember some years ago examining some fine old glass in Litchfield Cathedral; in one of the panels there was a representation of the building of Solomon's Temple; in this picture the Temple is shown as a great Gothic cathedral, the artists who designed it probably never suspecting that it might have been in another style.

The vital principle of classic architecture is horizontal, that of Gothic is vertical; one is that of the column and lintel involving the idea of rest, the other is that of the arch, the flying buttress and pinnacle, involving the idea of life and motion.

The two ideas are directly opposed to each other; the moment classic architecture admits the arch it ceases to be true to itself in any real artistic sense; on the other hand if it refuses to use the arch it confines itself within limitations of construction.

Unfettered by any classical restraint the architects of the north carried the use of the pointed arch to its highest perfections, and in their great cathedrals have left us examples of skill in scientific and artistic construction which, though often imitated, have never been surpassed.

Italian architects on the other hand were always under restraint, and while forced by the fashion of the time to use the pointed form of arch, they were never able, except in a few instances, to do so with the boldness and skill of their contemporaries of the north. They often employed it for mere ornament, and in many instances in so faulty a manner that the arches had to be held together with iron ties from the day of construction.

While the Italians here failed to produce buildings in the Gothic style of the purity of design and skill in construction that are to be found in the north, they have, nevertheless, executed many noble buildings in which we can study their successes and failures in dealing with a style that was not indigenous to the country and in which they endeavoured to reconcile the principles of two styles that are far apart, and which we are inclined to consider unreconcilable.

Besides the influences to which I have already referred, there are other two which we find more or less strongly marked in mediaéval work—these are, first, local, and second, personal influences.

Local influence was a natural result of the division of the Italian people into two hostile camps of the Guelfs and Ghibelines; the adherence to one faction or the other not only kept the cities apart, but often at war one with the other. When we consider the disturbed condition the country was in, in consequence of these quarrels, we might expect to find art retarded and incapable of development—on the contrary, however, we find that progress was made, but owing to the lack of community and freedom of intercourse, the principal cities developed the Lombard and Gothic styles of architecture in a manner peculiar to themselves. Thus we have well defined local characteristics of the Lombard style at Pisa and neighborhood, and of the Gothic style in Venice, Verona, Bologna, Florence, etc. These cities, along with others which might be named, became at a later date local centres or schools of painting, each marked by treatment of their subjects peculiar to the great masters of the respective schools. We thus have in the domain of the fine arts the Venetian, Florentine, Pisan, Milanese and other schools, and in like manner we have the local characteristics of the respective cities marked in their architecture.

The personal influence exerted by individual architects is more marked in Italian buildings than in those north of the Alps. In the great cathedrals of France and England the names of the designers is in most cases unknown, but in Italian architecture individual names are brought prominently before us.

Among the more prominent I may mention Arnolfo, son of the German architect whom I have already referred to as giving the design for the first Gothic building in Italy. Arnolfo's name is associated with the great duomo and the church of Santa Croce in Florence.

Pisa, a celebrated centre of mediaeval art, sent forth a number of sculptors and architects, but her most distinguished son was Nicola Pisano, whose sculptures adorn the cathedral at Sieana and Orovietto, and who furnished the design for San Antonio at Padua and probably for the cathedral at Orovietto. His son Giovana was scarcely less distinguished than his father.

In the following century Giotto, distinguished as a painter as well as an architect, constructed buildings in the Gothic style of which the campanile of the duomo is, at Florence, the most distinguished example. These men, with others I might mention, not only impressed their individuality upon their works, but formed centres or schools of design.

Apart from the local types of the Gothic style and the personal influences to which I have alluded, we have occasional buildings in which local influence is not evident and where the design is so unlike other Italian buildings as to suggest foreign influence; the most notable example of this influence is found in the greatest of all Italian buildings, the Cathedral of Milan.

I might go on to mention in detail features of Italian buildings that attract the attention of the traveller who has previously visited the great cathedrals of the north, and who at once realizes that he is in a different art atmosphere. He will notice the absence of buttresses on the flanks of the buildings, the absence of flying buttresses, the small size of the windows and the absence or meagerness of tracery with which they are ornamented, the absence of colored glass, the absence of triforiums over the nave arches and the meanness of the clerestories. He will notice how columns are used singly or in pairs—and the use of colour on the walls. Of these details time forbids me to speak, but before closing I will mention one material used in the construction of Italian buildings that meets us at every stage in our study of Gothic architecture, that is bricks and terra cotta. Italian brickwork is remarkable for the skill shown in the use of what we are inclined to deem an inferior material in the elaboration of arches, tracery, cornices and mouldings, but as this is a subject somewhat foreign to this paper, and one that requires an evening for itself, I only refer to it.

STRENGTH OF COLUMNS.

If the fibres in any material body were exactly rectilinear, so that a rod being placed on one end in a vertical position, no one of the particles were opposite to the intervals between any two in a transverse section below it, it might be conceived that no force compressing the rod in the direction of its length would produce any other effect than that of diminishing its length. But as we find that all bodies when so compressed may be bent and finally broken, such a disposition of the particles is destitute of probability. In fact, when a pillar is compressed by a great weight above it, either the fibres already curved have their curvature increased so that the whole pillar bends, or the particles in some of the transverse sections are forced outwards by lateral pressures arising from those above and below their intervals being thrust between them, and then the pillar swells on its whole periphery. The consequence in either case is that the cohesion of longitudinal fibres is impaired or destroyed, and the pillar is at length broken or crushed. The strength of a pillar when so compressed must evidently depend upon the number of particles in a transverse section, that is, upon the area of such section, but since besides the displacement of those particles from the longitudinal pressure their lateral cohesion must be overcome before they can be thrust outwards, it is evident that the strength is not proportional to the area simply, but to some function of that area. No law on which any dependence can be placed has yet been discovered for the strength of a pillar in such circumstances.

THE BUILDING OUTLOOK.

INFLUENCED by the general depression in business, the building trade in Canada has for some years been in a state of inactivity, and much below what might be expected in a young and vigorous country. As each year passed by, it was hoped that the worst had been encountered, yet the season of 1896 proved to be one of the least prosperous. The unsettled condition of the country politically, and the uncertainty with regard to the tariff both in Canada and the United States, had a depressing effect, and many buildings which would otherwise have been erected still remain in a embryo state until the action of the government is made known. The low rentals obtainable in many of the larger cities offered little inducement to speculators, and consequently a few office buildings constituted the major portion of construction.

With the object of learning as far as possible the conditions likely to prevail in the building trades during the approaching season, letters were dispatched by the publisher of the ARCHITECT AND BUILDER to architects in the different cities, asking their opinion of the outlook. The replies received, although pointing out that many projected works are yet in an unsettled state, and may or may not be proceeded with, afford some degree of encouragement. It is generally conceded that little change will be made in the tariff by the government, and the official announcement of this fact will be certain to stimulate building operations and restore confidence to business in general.

In Toronto, the new building at the north-west corner of Yonge and King streets is perhaps the largest yet arranged for; the plans are being prepared by Messrs. Darling & Pearson. A large hotel and several other buildings of some prominence are spoken of, but are not yet regarded as certainties. The renovation and remodelling of office buildings is likely to account for a considerable expenditure, as the owners will be compelled to improve their properties in order to retain their tenants. Montreal architects report the season to be opening up somewhat brighter than last year, with several undertakings hanging in the balance. The towns adjacent to Montreal are apparently more prosperous. In the city of Ottawa the prospects for building operations are decidedly encouraging, a number of recent fires having assisted in this direction. The rebuilding of the departmental block and the new building of the C. Ross Company are the most important works now under construction. The addition to the Protestant hospital and a proposed opera house will reach in value $100,000, while other buildings equally costly are either under way or contemplated. In western Ontario architects do not take a discouraging view of the future. A $60,000 hospital is talked of at London, and two buildings of good size will be erected in Hamilton. The bulk of the work in the latter city, however, will consist of residences and alterations to existing buildings. In the vicinity of Stratford a fair amount of building is reported, and at Owen Sound elevator and flour shed extensions comprise the main work.

Very few large buildings are likely to be erected this year in Manitoba and British Columbia. A large university building will probably be built at Winnipeg, at a cost of $60,000. In the Pacific coast province the cheaper class of buildings promise to predominate particularly in the vicinity of mining operations. From the maritime provinces favorable reports are received.

No small amount of material and labor promises to be utilized in 1897 in government work, the appropriation made by the Dominion parliament for canals alone reaching five million dollars. Comparing the situation with past years, we think there is a fair prospect of an improvement in building during the present season.

BY THE WAY.

AN interesting decision was given by the Court of Appeal at Montreal the other day. A stone cutter named Jacques Perrault sought to recover damages from the Stonecutters' Union, alleging that he had been deprived of his employment by reason of the refusal of the officers and members of the Union to work with him. At the first hearing the case was dismissed, but the Court of Review, on appeal, awarded the plaintiff damages in the sum of $137. This decision has now been reversed by the Court of Appeal, thus affirming the right of the members of the union to refuse to work with a non-union workman. It should be mentioned, however, that the decision was not concurred in by two of the judges before whom the appeal was argued.

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FROM the past and present condition of some of the gaol buildings in Canada, it might be inferred that the county authorities are of the opinion that the health of a prisoner is a matter of little or no consequence—in other words that anything should be good enough for a "gaol bird." Many persons regard the matter in a different light, however, and properly maintain that neglect to provide conditions conducive to health should not form part of the punishment meted out to prisoners. Holding strongly to this view, I note with pleasure that the Inspector of Gaols, Prisons and Reformatories for the Province of Ontario reports that considerable improvement has been made by many of the County Councils throughout the province in remodelling, repairing and furnishing gaols during the past year, and greater attention has been given to their ventilation, drainage, heating, lighting and water supply. The inspector adds that much yet remains to be done in this direction, and intimates that some of the derelict counties are financially well able to remodel or rebuild their buildings.

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IN Scripture we are told that no sensible man commences the erection of a building until after he has first counted the cost and carefully considered the condition of his bank account. Some individuals and public bodies overlook this very necessary preliminary procedure, and plunge right into the enterprise, trusting to chance or Providence to help them out. Such persons bring ridicule upon themselves by their lack of sound judgment. Public bodies seem to make blunders of this character quite as frequently as private individuals, and their undertakings being a rule on a larger scale, their mistakes are more conspicuous. In France, we are told, owing to the state of the national finances, many public buildings stand in an uncompleted condition, and so surrounded by scaffolding as to be almost concealed from view. The Arc de Triomphe, in Paris, was thus obscured, until the recent visit of the Czar, when the sense of national pride caused the scaffolding to be removed. Some years ago it was discovered that the statues which adorned the upper part of the second court of the Palais-Royal were in danger of falling, and it was decided to repair them, for as the works of Pagou and Gerard they are worthy of preservation. Apparently there is no money to pay for cement, and in consequence the timbers are decaying. In the United States and Canada we are quite as ready as Europeans to undertake beyond our means, but our method of doing things is somewhat different. Instead of stopping the work on a public structure until funds are available for its completion, we go ahead and finish the work with borrowed money, for which we pledge the credit of future generations, thereby escaping the ridicule which would come upon us were we to follow the French practice.

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SINCE the microbe theory became an accepted fact in medical science, we have learned to believe that we are beset on every hand by unseen dangers. It is undoubtedly matter for regret that there are so many intelligent persons who refuse to recognize a danger which is not discernible to the naked eye. The recognition of the germ theory, for example, would lead to more careful attention to health requirements in the matter of plumbing, ventilation, etc. On the other hand, one cannot but feel in a measure thankful that people are not easily frightened by hidden causes of danger; if it were otherwise many nervously constituted persons would be in a state of continual worry in their efforts to shield their health and that of friends against invisible foes. Notwithstanding the numerous quarters from which we have been lead to expect an attack from these foes, it is somewhat surprising to be told that recent examinations in Germany prove that bacteria flourish exceedingly in certain building stones—even those which are non-porous in character. In consequence of this discovery it is recommended that only non-porous stone, such as granite, should be used in hospital construction. I do not imagine that the publication of this item will seriously affect the stone market, notwithstanding that the alleged discovery comes from Germany.

ILLUSTRATIONS.

RESIDENCE AT MONTREAL.—R. FINDLAY, ARCHITECT.

COTTAGE FOR MR. F. W. LENT, ELMVALE, ONT.—KENNEDY & CO., ARCHITECTS.

EMERALD STREET METHODIST CHURCH, HAMILTON, ONT.—A. W. PEENE, ARCHITECT.

CLUB HOUSE OF THE VICTORIA YACHT CLUB, HAMILTON, ONT.—A. W. PEENE, ARCHITECT.

ADDITION TO LIBRARY AT OSGOODE HALL.—BURKE & HORWOOD, ARCHITECTS.

THE addition illustrated in this number is an annex to the main library and is situated to the west of the same, entered by a door to the south of the chimney-piece.

As it was necessary to place it between the walls of other portions of the building, almost the whole source of light is from the roof, two small windows being available to the north for purposes of ventilation.

The instructions given the architects were to provide the maximum of wall space, discarding all features which would occupy space needed for books.

The space available and the requirements dictated a two-storey arrangement of shelves, access to the upper range being gained by a narrow gallery and spiral staircase.

The shelving, and interior finish generally, is of quarter-cut oak, the flooring is of parquetry, and the cove of the ceiling is executed in staff, the work being specially modelled from the architects' designs.

The artificial light is entirely by electricity.

CORRECTION.—The illustration of the Nordheimer building in our last issue should have been marked Colborne street, instead of King street. Siddall & Baker, architects.

STUDENTS' DEPARTMENT.

THE ETHICS OF THE SKETCH BOOK.

IN an article addressed to students of the R. I. B. A., and published in the Journal of the Society, Mr. Paul Waterhouse writes as follows on the above subject:—

Here, then, we face the questions, what is the need of sketching, and what is the good of travel? The bookshelves of any good office, or failing them the Library at Conduit street, will afford you the opportunity of studying, comparing, and committing to memory any building of importance in any country or of any age; why, then, should one travel a few hundred miles to make an inferior copy in one's own sketch-book or to study these things under less comfortable circumstances? The man who could seriously ask this question could never arrive at, could never understand, the answer. It is of course the fact that our many and accessible records have made study a thousand times easier, and have rendered possible as never before the science of comparative archæology. Nay further, these ready helps have made it no unlikely thing that a man should become even expert in the architecture of a country he has never visited; certainly it is possible for a student to have knowledge, and real knowledge, of more than he can ever even attempt to see with his own eyes and draw in his own sketch-book. But is the sketch-book therefore to die? Never, and for these reasons: Primarily, because in architecture the pencil works with the brain, and the brain with the pencil. To draw is to learn. It is impossible to learn architecture without drawing; it is impossible to draw architecture without learning. You can draw from engravings and photographs of course, but that is a lifeless sport at which Nature revolts, and you have to reckon with human nature even in an architect's fibre. Again, there are more things in a building than the best book can give you. We are saved the necessity of visiting all buildings, but we must visit some at least and we must draw some. The resources of other men's labors, engravings, lithographs and photographs have brought us much; they have taken away the need of sketching as a means of essential record, but they have not killed the sketch-book—rather they have given the sketcher a new scope and a glorious liberty—a liberty which no man should abuse. So long as you draw—and draw you must—you may now draw what you will. Some of the necessity has gone, but none of the duty; and duty has its laws. Here are some of the guiding lines: Never draw to make a pretty sketch-book—Burges taught us that. Of two subjects never choose the easier because it is the easier. Draw what you think you cannot remember rather than what you can. Never be timid, and, above all, draw whatever you admire. Such are the rules we glean from the direct teaching and still more from the indirect example of those who have been and are the great masters of that magnificent and most modest art, the art of keeping an architectural note-book.

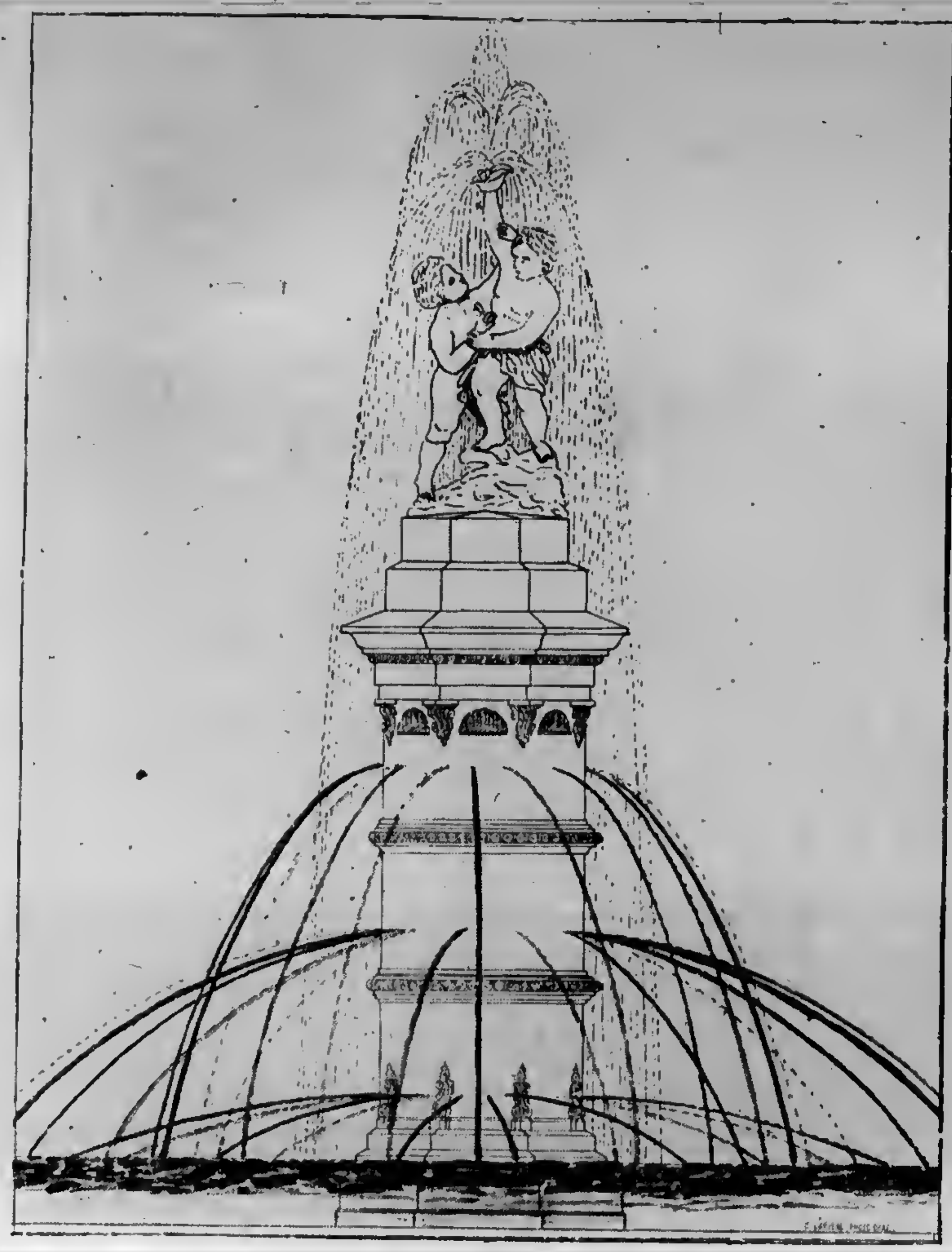
When using transfer graining paper, the surface to be grained simply requires painting the ground color of the wood to be imitated. Of course, this must be quite dry. Then cut a piece of the transfer paper a trifle larger than the surface to be grained, and laying it smoothly on the table, damp the back slightly with a sponge, but do not soak it, and a few minutes after apply the face side to the work, taking care that every part is in contact, and do not smudge it. After about two minutes peel off the paper, when a perfect grain will be left on the wood.

ELECTRO-CHROMATIC REVOLVING FOUNTAIN.

We illustrate herewith an electro-chromatic fountain, designed and patented by Mr. Chas. Baillargé, architect and C.E., Quebec.

Everyone has seen the beautiful laboratory experiment of electro-lighting a jet of water issuing from a fountain, where the light, instead of passing through the jet into the surrounding air, is, on account of its parallelism to the initial portion of the parabola described by the jet, reflected from point to point along its upper surface and follows the jet down to the very reservoir, cistern or basin into which it falls, thus illuminating the jet and also for several inches the water in the basin itself around the point where the jet impinges on its surface.

The jet, by the interposition between it and the light of a colored lens in the inner skin of the fountain, may be made to assume any hue, as that of ruby, emerald, topaz, etc., or that of a jet of molten silver, gold, or any other liquid or fluid substance. Or the lens may be white or uncolored, and the same effect produced by the interposition of a piece of colored or stained glass between it and the light.



ELECTRO-CHROMATIC REVOLVING FOUNTAIN.

Now, if there be a series of plates of vari-colored glass made to move by clockwork opposite the lens, the jet will change its hue or tint accordingly and produce an almost magic effect. This, during Mr. Baillarge's lessons in physics at the Laval University, was most beautifully illustrated by Professor Laflamme during one of his lectures on the reflection of light. And that light can be made to follow such a curved path is also illustrated in the larynoscope—a small tube having on its upper surface a series of tiny mirrors, by which, when the tube is introduced through the mouth into the stomach, and a ray of light thrown into it, the interior of the same may be lighted up and reflected back by means of the same mirrors to the operator's eye.

Suppose now, as in the design here given in photogravure, that, around a cylindrical fountain with an electric arc light in the centre, there be a series of such jets issuing from its outer skin, with a lens opposite each jet, all on exactly the same level, and vari-colored glasses opposite each lens, it is evident that every one of the jets will be simultaneously illuminated and colored, and if by clock machinery a little tramway carrying the stained glasses be made to revolve, the effect will be charming indeed.

But to render the illusion more fairy-like, the inventor proposes, as seen by the illustration, that there be three such horizontal series of jets. Let there be, for instance, as in the model, three series of 12 jets each, spaced so as to divide the circuit into 36 angular spaces of 10° each, and opposite each series a separate central arc light, aluminum, oxy-hydrogen, acetylene, or any other brilliant source of light—three tiers of lenses, three tiers of tiny coloring tramways—and while the central tier remains a fixture, let one of the tramways be made to revolve to the right, the other to the left. It will thus be seen that the continuous change of colors in the jets must and will give them the appearance of playing at leap-frog, the one with the other.

The effect would be most enchanting, and the inventor hopes that, pending the time when poor old Quebec will be able to devote a few thousand dollars to the consummation of so desirable an object of ornamentation and attraction in one or more of its public squares, or parks, or gardens, some other city or well-to-do individual will take hold of Mr. Baillarge's idea and carry it out, either with only one jet, or more on the same level, lit by one light for economy, or with two, three or more than three series of jets and as many lights as series, and on any scale whatever; for it is evident that instead of one light at the centre, if the interior of the fountain be of such diameter as to allow of it, there may be, where expense is no object, a separate light opposite each jet, with a reflector behind it, thus producing a more brilliantly illuminated fountain.

Nothing could well be conceived more admirably suited to give eclat to the forthcoming illuminations and pyrotechnics in honor of the Victoria jubilee.

The highest human habitation in the world is said to be the railroad station at Galera, in Peru, lying 15,635 feet above the sea.

At an open session of the Toronto Art Students' League held last month there was a large attendance of the members and their friends. An interesting address was delivered by the president, Mr. Holmes, on "Symbols as they Appear in Art and Architecture," followed by luncheon served by the ladies of the League.

BEAUTY IN COLOR AND FORM.

Mr. John Aldam Heaton, of London, delivered a lecture to the members of the Leeds and Yorkshire Architectural Society, a short time ago, on "Beauty in Color and Form." He said that false color and false form were mere exaggerations, distortions, excesses of good color and good form. What we wanted, therefore, above all things, was temperance. Nature was always temperate. A student of color soon found out that beauty of color began with graduation—that the loveliness of graduated color was so great that, relatively, level color was not beautiful. But he also found that there was no such thing as level color in nature; natural color was always in a state of gradation. Nature teemed with gradations; even when she played high she did so with a splendid moderation. He had made careful studies of many beautiful colored things—flowers, irridescence on pigeon's necks and shells, peacock's feathers, fresh mackerel, and many other such things—and he never came upon a piece of brilliant color where he was not bewildered and puzzled by the complex ways in which harmonious and even opposing colors interlaced and died into each other. Not a few people desired, above all things, that their surroundings should be in the highest taste, and who were nervously anxious and uneasy as to whether things would "go with" sundry other things. In gathering a posy one gathered flowers as a rule without any idea of what would "go with" each other, but simply the flowers that happened to be blooming and of the right dimensions for the proposed posy, and in ninety-nine times out of a hundred the flowers gathered "went with" each other delightfully. Why, then, should people be so nervous as to whether the proposed carpet would "go with" the proposed curtains? Clearly because the color of one or both was bad—crude, violent, or without gradation; and because, while the posy was well mingled with green and gray and neutral tints, the carpet and curtains were wholly or partially deficient in these. If one wanted to try whether this practically was so, let him buy or borrow a real fine old Persian carpet, which would probably contain blues and greens, reds and yellows; in fact almost as many colors as the garden posy. He would find that the chances were enormously in favor of its looking well in any room in which he might throw it down, with an entire disregard of what might be already there. Let them take care that each color in each article they bought was soft and graduated and free from crudity, and then they might set them all together and be happy. As gradation was the condition of beauty in color, so curvature was the ground of all loveliness in form; but temperance, again, was the ruling power.

PUBLICATIONS.

"Public Work Directly Performed," is the title of an interesting article, by Sylvester Baxter, in the April number of the Review of Reviews. The co-operative contract system in vogue in New Zealand is described and also advocated, as likely to provide a method whereby direct employment by the government would be consistent with a full return for the money expended.

We are indebted to Mr. E. M. Renouf, 2238 St. Catharine St., Montreal, for a copy of an Annotated Bibliography of Fine Art—embracing painting, sculpture, architecture, arts of decoration and illustration—by Russell Sturgis, architect, and Henry Edward Krehbiel, musical author and critic. The book is published by the American Library Association, and sells at $1.00 per copy in cloth covers.

WORKS OF CONSTRUCTION.

The Ziegler-Hinch Company, of Guelph, Ont., have lately fitted up a new dry goods store in that city. The heating is by steam, of the one-pipe system, and was put in by Messrs. Feek & Phillips. The hydraulic elevator was furnished by the Fensom Elevator Co., of Toronto.

The new pathological museum and bone-room in connection with McGill University, Montreal, is nearing completion. The work has been carried out under the supervision of the University architect, Mr. A. T. Taylor. Galleries extend around both rooms, and large cases have been placed around the walls for pathological specimens. In the museum a small office for the janitor has been constructed immediately beneath one of the galleries. Both rooms are painted in a delicate shade of cream, the backs of the cases being finished in green. The ceiling is of robin's-egg color. A novel idea has been carried out in the frieze, which is so constructed as to contain diagrams of various peculiar diseases.

The new bridge to replace the railway suspension bridge at Niagara Falls, which is now nearing completion, is 1,100 feet long, and the highest part of the arch is 226 feet above the river, the arch being 550 feet of a stretch. It will have a double deck, one over the other, the upper one for railway purposes and the lower one for carriages, trolley tracks, etc. The main arch is composed of steel four feet thick and three feet wide, and the total amount of steel that will compose the bridge when completed will be over six million pounds. It will carry a weight of 3,500 pounds to the square foot on the upper deck and at the same time 3,000 pounds to the foot on the lower deck.

The firm of Gordon & Keith, Halifax, N. S., have completed a palatial brick building on the corner of Barrington and Granville streets in that city. The floors are of cement, and the western part of the basement is lighted by prism lights set in the sidewalk, the glass in these lights being six inches in thickness. The heating is done by two "Daisy" heaters of the largest size manufactured. The floor of the entrance is laid in tinted tiles. The show-room is 120 feet long and 40 feet wide. The offices, 25 feet in length, are divided by a partition of quartered oak and glass, with grille lattices. The flats above are so arranged as to utilize all the floor space to the best advantage. The electric elevator was furnished by Leitch & Turnbull, of Hamilton, and Mr. McArthur was the general contractor. The plans were prepared and the work constructed by Mr. W. E. Whiteway, architect.

The Ottawa Trusts and Deposits Company have just completed at the corner of Sparks and Elgin streets, Ottawa, extensive vaults and offices. In the main office is a circular counter of mahogany, richly carved and artistically panelled, the chief clerk's office being enclosed in a canopy of oxidized brass. The wainscotting is composed of solid Tennessee marble, relieved at regular intervals by blocks of onyx stone. The window sills are also of white marble. The flooring is mosaic pavement made of Italian marble, executed by Mr. Robert Reid, of Montreal. The business office is separated from the vaults by a partition of steel bars, extending from the floor to the ceiling and arranged in a semi-circular form. The vault proper is 7½ feet wide, 12½ feet long and 8 feet high, lined throughout with solid chrome steel. The deposit vault contains two sets of deposit boxes, with 246 in each set. To the rear of this vault is a storage vault, separated by a polished steel grate made of steel bars two inches in diameter. The main guard room is of steel, six inches thick, and weighs 5½ tons. The weight of the hinges is 700 lbs.

PERSONAL.

Messrs. Rogers & McFarlane, architects, have opened an office in the Fleming Block, Windsor.

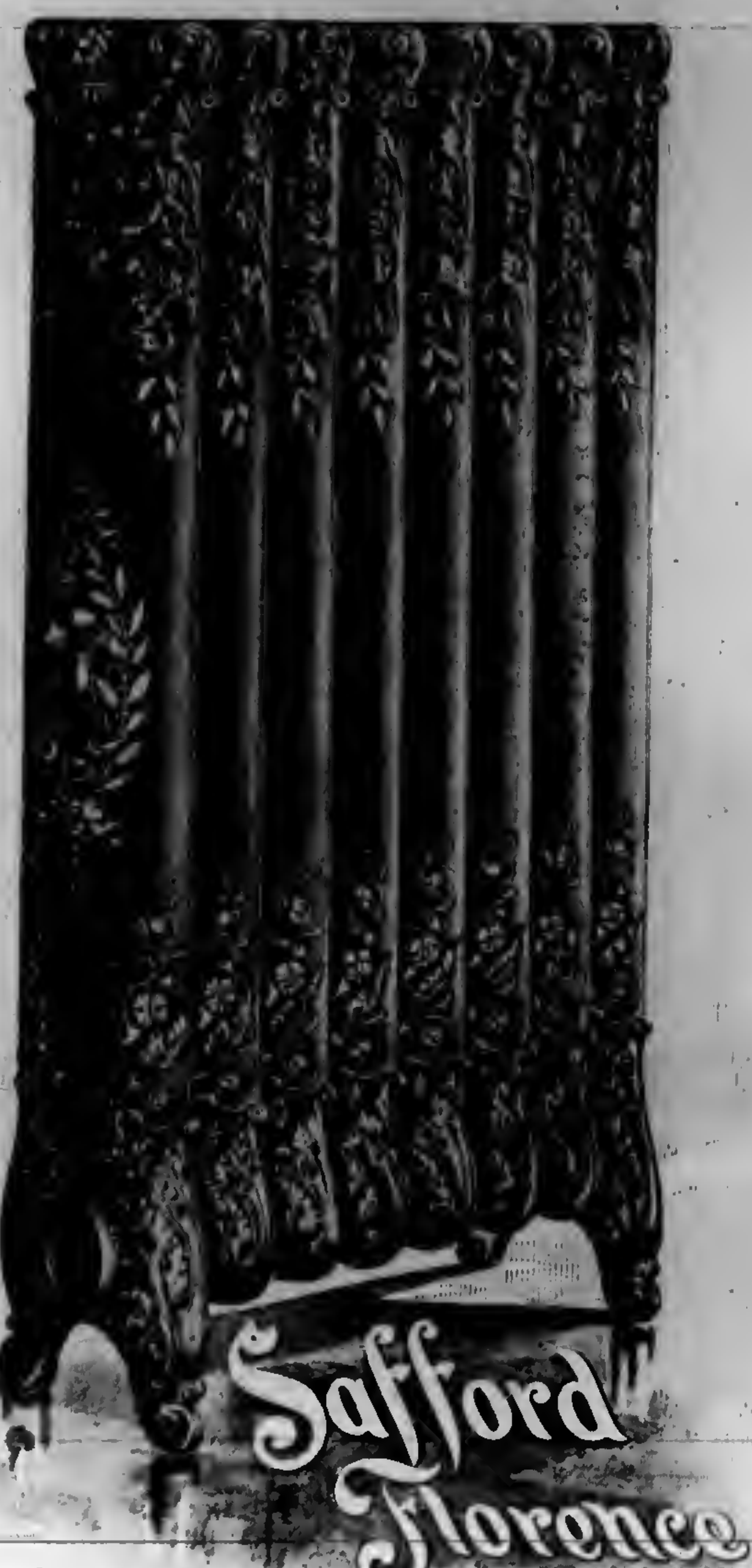
Mr. Wm. McNally, cement merchant, of Montreal, has returned from England, after an extended visit.

Mr. J. H. Balderson, secretary of the Department of Railways and Canals for the Dominion, has been superannuated, owing to the abolition of the office.

Mr. Philip C. Palin, a clever young architect of Toronto, has recently commenced the practice of his profession at Rat Portage, Ont. If the reports which have reached us recently of activity in building operations at Rat Portage are well founded, Mr. Palin has made a wise choice of location, and in selecting as his field of effort a new and rapidly developing part of the province rather than the older districts, his judgment is to be commended.

CANADIAN HEATING APPARATUS AND METHODS.

In view of the fact that the climate of Canada in winter is at times somewhat severe, it is not surprising that the subject of artificial heating has here received much consideration, and as a result, heating apparatus and methods have been brought to the highest standard yet achieved in any country. In the early half of the century this subject received little or no attention. The open fireplace was the means employed both for cooking and heating. Then followed wood stoves, which, after



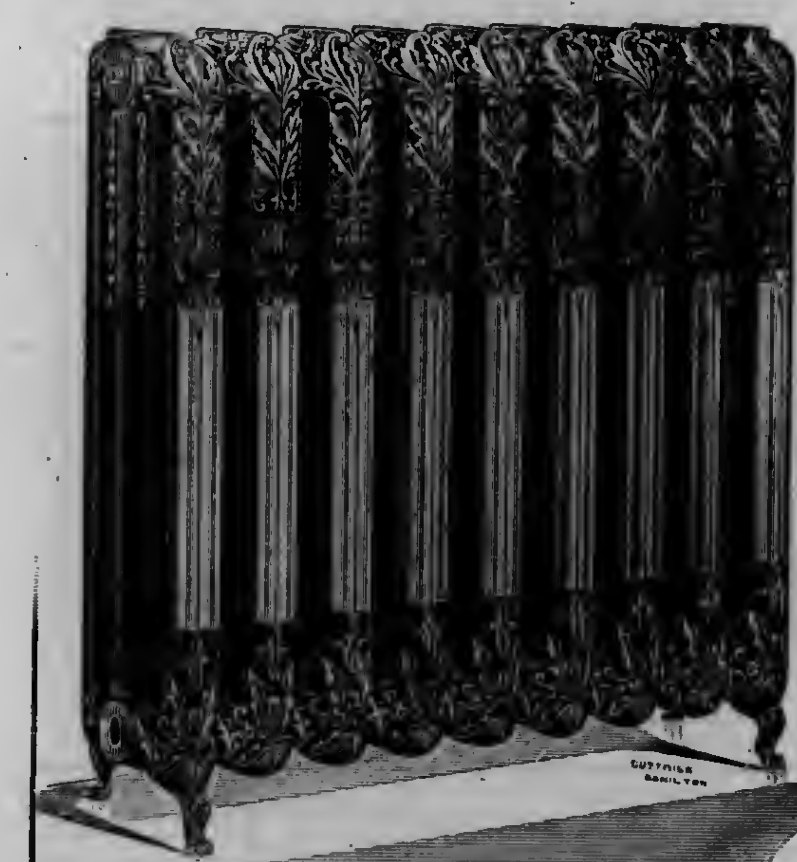
a considerable period of service, gave place to coal ranges for cooking and base burners for heating. With the advent of the latter the acme of method was believed to have been reached.

About twenty-five years ago the founders of the present firm of Warden King & Son, of Montreal, first introduced into Canada the method of heating by hot water. No better means could be found of rightly estimating the wonderful development which has since taken place in this direction than by placing side by side the old square "Spence" boiler first manufactured by the above-named company with the well-known "Daisy" boiler of which they are the makers at the present day.

In Ontario, where the climate is less severe than in the province of Quebec, improvement for many years took place on the line of heating by means of hot air furnaces, a system which, owing to its efficiency and cleanliness as compared with stoves, is still largely in use.

About fifteen years ago hot water heating was introduced in Ontario by the Gurney Company, who have since been in the front rank of inventors and manufacturers in this field. As a matter of course they were not long without competitors, and at the present time there are probably not less than twenty firms engaged in the manufacture of boilers, furnaces and radiators throughout Canada.

The number of manufacturers, however, is small compared with the number and variety of apparatus manufactured. As the manufacturers in this line increased, the law of self-preservation compelled each one to give the closest study to the scientific principles of heating and the devising of apparatus by which the largest amount of heat could be obtained and transmitted with the least expenditure of fuel. At the



Hamilton Radiator.

present time the principles underlying the generation and transmission of heat and the means of putting them in operation are so well understood that there is no place on the market for poorly designed and inefficient apparatus. A recent visit to several of the leading manufactories revealed the fact that, notwithstanding the degree of perfection which has been achieved, there is a constant striving after improvement, and apparatus embodying new features in design and construction is constantly being placed on the market. In this connection mention may be made of the following new apparatus: The Doric hot water boiler, operated by both the gravity and pressure systems, introduced last year by the Gurney Foundry Company, and which by reason of its low cost and efficiency is reported to have met with a gratifying degree of favor; the new down-draught Economy school heater put on the market last autumn by the Pease Furnace Co., Toronto. This furnace is designed to burn wood or coal screenings, and in the case of a public school building near Toronto, is credited with having, by the use of screenings, cut the coal bill in half. The Pease Company are also preparing to introduce a hot water boiler which is said to embody some new features in design and construction.

The James Smart Manufacturing Co., of Brockville, introduced in the Canadian market last year, the "Kelsey" warm air generator, which is said to embrace a number of special and advantageous features, such as large radiating surface, sectional fire pot, and a patent attachment designed to prevent the short pipes from robbing the long ones. This furnace is said to have met with a satisfactory sale.

It is the writer's opinion that if the same degree of thought and care that have been devoted to the invention and construction of heating apparatus were to be exercised by the persons entrusted with the work of installing the same, the operative results would be more satisfactory than they now are.

In pace with the development of hot water and steam heating boilers has come improvements in radiators. The Toronto Radiator Manufacturing Company and the Gurney Foundry Company of Toronto, who are

Box Base, showing Back Damper open and Front Damper closed.

the pioneers in this line have recently been joined by the Gurney-Tilden Co., of Hamilton, one of whose radiators is shown on the preceding page, and a third company is in process of organization in Toronto for the purpose of engaging in this branch of manufacture. Radiators are now made in Canada in such a large variety of styles as to be adapted to almost every conceivable situation, from my lady's boudoir to the deck of a war ship—one of Her Majesty's ironclads having been fitted by the Toronto Radiator Co. last winter, while lying in Halifax harbor. The accompanying illustrations show the perfection to which this branch of a modern heating system has been brought. The Florence radiator is the latest product of the Toronto Radiator Company's skill, and is herewith illustrated for the first time. The illustration on this page shows an Oxford ventilating flue box base radiator, recently placed on the market by the Gurney Foundry Co. By means of a register damper shown in the engraving, cold air can be taken in at the bottom of the radiator, either from the room or from outside, conducted up between the coils of the radiator, becoming warmed thereby, and discharged into the atmosphere of the room from the top of the radiator. By this method the objection sometimes raised to hot water heating that it makes no provision for ventilation, is removed. This is a feature which is likely to commend Canadian radiators to European buyers, who are possessed of very advanced ideas on the subject of ventilation.

A Toronto company has made an entirely new departure in this line by manufacturing radiators for heating by electricity. These radiators are made of Canada Plate, and are about 3 inches in diameter. They are arranged horizontally like steam coils, and are intended to be supplied with current from the electric light company's mains. So far as we are aware none of these radiators have as yet been installed. The possibility that the cost of heating by this method can be reduced to present standards is extremely doubtful, for which reason, as well as the fact that the method is to a large extent an untried one, the company who are seeking to introduce it are likely to meet with great difficulty.

MONTREAL.

[Correspondence of the Canadian Architect and Builder.]

P. Q. A. A. DINNER.

The Quebec Association of Architects held their second and last dinner for the season on the 16th of March. The attendance was good, and the occasion proved both interesting and instructive. The president, Mr. A. T. Taylor, occupied the chair. The association will, it is hoped, continue these dinners next year, as the benefits derived therefrom in the promotion of cordial relations between the members are quite apparent. Much of the success which these gatherings have attained in the past may be said to be due to the efforts of the presiding officer and the committee in charge.

ROYAL CANADIAN ACADEMY EXHIBITION.

The seventeenth annual spring exhibition of the Royal Canadian Academy opened on April 1st at the Art Gallery, Phillips Square. A large assembly of members filled the galleries, refreshments were served and an excellent programme carried out.

As a whole the exhibition, although perhaps not quite so good as its predecessors, possessed much work of good quality.

Among the best exhibits may be mentioned those of Messrs. R. Harris, Alp. Jongers, E. Dyonnet, Maurice Cullen, M. Robertson Mr. Fraircbere, Mr. Brymner, A. Patterson, J. Hammond, J. Pinlsey, Suzor Cote, and others having their respective merits.

The portrait of "A Lady" also that of Colonel Jeffrey Burland, by Alp. Jongers are worthy of mention. Mr. Dickson Patterson exhibited a well rendered portrait of Prof. Chapman, and Mr. Dyonnet showed some landscape studies which are very good.

Mr. Pinhey's "La Penserosa" is well treated. Mr. Robert Harris exhibited some splendid portraits. Mr. Brymner's "Gray Girl" is certainly one of the best pictures in water color. The Canadian landscape studies, by Mr. Maurice Cullen, are much admired.

The sculpture department is small, but of good quality. Mr. Hill's portrait and bas relief are treated in a very decorative way.

Mr. Hebert's portraits in bronze are splendid. The group "Convoitise" is a fine piece of art.

STRIKE OF BRICKLAYERS.

A strike of short duration was commenced last week by the bricklayers of the city. The members of the Bricklayers' Union have been receiving 30 cents an hour for ten hours per day, but demanded that the scale of wages should be increased to 35 cents an hour, and that nine hours should constitute a day's work. At first neither side showed any inclination to yield, but through negotiations conducted in an amicable spirit, an agreement has been reached, fixing the rate of wages at 35 cents an hour for nine hours a day, and providing that union bricklayers shall be given employment in preference to others. The agreement dates from April 1st, and is for one year, four months before the expiration of which a conference is to be held to consider future relations. It is a matter of congratulation that an early settlement of the trouble has been effected.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Studded Partitions. THERE is too much looseness in this country in the construction of studded partitions, both as to the manner of finishing up, and as to the dimensions of material used. It is not good construction to run up a partition in a ten-foot ceiling with 2″ x 4″ scantling. Anything over nine foot in height should be studded with scantling not less than 2″ x 6″, and these should be made parallel and straight. At all door or other openings, the studs should be doubled, the two thicknesses spiked well together. This method is better than having the door studs 4″ x 6″ as the larger timber is more apt to shrink, check and cripple, conditions which may injure the plaster much, and interfere with the fine working of the door more. There should be cross tracing over the head of each doorway if the plastering is to be kept intact, and lines of tracing should be drawn from the center of the room to the side walls wherever possible, to assist in transferring the weight of partition from the joists to foundation walls direct. Trimmers should be "cut" in snug between studs to make the wall solid, about half the height of the ceiling, if ten feet or less, but if a ceiling is more than ten feet, there ought to be not less than two lines of trimmers in the wall. These trimmers should be the full width of the studding—in fact, they should be cut from stuff the same dimensions as the studding itself. It is not a good plan to run the studding to the floor and nail them to it. It is better always to put down on the floor a piece of dimension stuff and plant the studding on it. Doorways and other openings may be cut out after the partition is firmly secured in place. The same rules hold good for partitions formed of 2″ x 4″ scantling, only in the latter more care should be observed in tracing and cutting in trimmers, and making the whole solid and firm. Nothing destroys plastering more than the vibration of a wall caused by the slamming of a door or the jar caused by some body suddenly coming in contact with it. A wall should be firm enough to stand the sudden closing of a door without jarring. When a wall shakes from any of the usual everday causes, the end of the plastering on that wall is within measurable distance. In estimating for studding when the lathing is to go directly on to them, it is well to allow one stud for each running foot to be studded, whether it is for partitions or outside walls. This will allow for doubling studs at windows and doors, and will leave stuff enough to "cut in" trimmers and braces and ribbon pieces for the floors. Studding, when possible, should be put up in lower floors first, and if it can be done, a slight crowning should be given to the floors above, and as much of the weight as possible should be discharged on the side walls. A little attention to these rules will insure good lasting work, when their being neglected would lead to everlasting trouble and discomfort.

Painter's Measurement. THERE is often much dispute as to the proper way to measure up painters' work, owing to the fact that the uninformed do not think that a moulding or a return has any more surface on it than the distance across its face. As a matter of fact, every portion touched with a brush should be measured, and a tape line should be forced into every curve, quirk and corner of the work. Returns, panels, mouldings, architraves, heads, sashes and projections, should have the line bent around all their parts in order to get the exact surface measure. Turned work should have the line bent around it at its average diameter, but, if beaded or moulded, the largest diameter should be girdled and the stretchout of this should be multiplied by the length of the turned article to get the dimensions. In grille work, the usual custom is to measure one surface and multiply it by four, which will give the surface of the whole grille nearly. For doors, shutters and iron fencing add one inch for each panel, and one inch extra for each ½ inch bar in the railing; add thickness of doors, and when calculating length of door or shutter, add thickness to length. Thus, a door 2 in. thick and 3 x 7 ft., will measure for painters' work, 3 ft. 2 in. x 7 ft. 2 in. for each side, and if recess of panels and bends of mouldings are added—which should be—the actual measurements may be much more according to the number of panels and style of mouldings in the door. The number of feet obtained divided by nine will give the number of yards. All painting under twelve inches wide, such as base-boards, cornices, corner-boards, water-tables, etc., should be measured up as being one foot wide, nine feet in length making one yard. Gutters, conductor pipes and similar work are charged double their outside measurement. Sashes are painted by the piece according to the number of lights; the same for glazing them. Work requiring a ladder must be charged extra. It requires about one-third more time to paint from a ladder than from the ground. Brackets, etc., are charged by the piece; if in place and a ladder is required to get at them, then add double price to what the cost would be if the work was done in the shop. Outside work should be painted every five years and inside work every seven years at least. Grained out-door work should be varnished every two years to save fresh painting. Inside grained work may run four or five years without being re-varnished. Hard finish should be re-touched every few years if it is desired to have it look fresh. It flattens and dulls in five or six years.

Talks on Plumbing. MANY times the plumber is put to his wits' end when making repairs or putting new work into old buildings. Frequently injured pipes and other fixtures that never give satisfaction have been so placed that they are continually out of order, and no amount of repairs can ever make them give entire satisfaction. Misplacement, in fact, is the most common cause of the mischief. An undue exposure to cold, or a too close fitting to range or stove, or else being placed where they are subject to jars or violence, are the most prevalent causes of pipe and joint disruptions. The danger from frost may be avoided by suitably disposing the pipes with relation to the heating apparatus, or by placing them at least in the farthest interior of the house. Direct contact with or close proximity to the outer wall of the building should be carefully avoided. The danger from heat comes from the common practice of crowding together hot and cold water pipes within the limits of a narrow chase or enclosure built in the house-wall. The pipes frequently get overheated and expand their legitimate dimensions, often straining the couplings and otherwise doing serious injury, causing leaks and disruptions. Into this same enclosure other pipes are often crowded, and coming in contact with lead or other pipes, injure them in process of time by mechanical pressure. It is, therefore, advisable that these chases, or recesses in the wall, should be more spacious than is ordinarily deemed necessary, or that separate provision should be made for carrying the water pipes alone. For convenience in the making of repairs, and in order that less injury to the house may be incident thereto, the chase or recess may be very fitly built upon the inner side of the walls, instead of within them, and sufficiently decorated to lessen its possibly obtrusive appearance. At all events, some provision should be made so that in case anything got wrong with the pipes, they could be got at without being obliged to cut into the wall or break through the plaster-work. In all cases where horizontal pipes are laid under the floors and across the joists, a strip of flooring over the pipe should be laid so that it can be taken up without trouble if desired. A little attention paid to matters of this kind when the plumbing work is being planned, will result in the saving of many a dollar, and much inconvenience and chagrin.

Mitre Joints. THERE are "mitres and mitres," as every workman knows, and though as a general rule it is not difficult to make a good mitre joint, there are some instances that seem to baffle the best of workmen. In these cases, however, it is safe to say that it is not the mitre that is to blame, if the mitre has been cut in a true box, but the conditions. Often a mitre is made and cut to fit some angle that is not a right-angled one, and while the truth may not be discovered by the workman he may waste a great deal of time—and patience—in trying to make a fit, when a true mitre is impossible. A great deal of the rule o' thumb business is practiced on square corners that are "not square." The workman should in all cases find out if the corner into, or around, which he is to make his mitre, is square, or at right angles; if so, well and good, his mitre-box will do the rest for him if he gets his proper lengths, and if the work is of such a character that a mitre-box cannot be used, he may apply one of the many methods for obtaining the lines of a mitre, and finish his work in accordance. If his angles are not square, then he must allow for the difference and work accordingly, which he can do satisfactorily if he possesses a fair knowledge of his trade. In the making of a perfect mitre joint, each piece should fit close to the other at all points, and not simply at the upper edge, or at the edge which meets the eye. Such a mitre as this has no strength in itself, and cannot be depended upon. It holds itself together because the moulding, or whatever the part mitred may be, is firmly fixed, and not because of any strength in the mitre itself. The larger the mitre, in case of mouldings especially, the more careful the workman ought to be in making the joint quite true at all points, so that when fixed together, the mitre may be glued, and so better able to stand and remain intact. One thing in connection with mitres the workman should never lose sight of; all the material used should be dry and well seasoned. If the wood be not quite dry, then the mitres will never remain as perfect as they should be, for no matter how well they may be made in the first instance, the shrinking and possible warping of the wood, after the work has stood for some time, upsets all calculations and destroys at once all possibilities of good and perfect workmanship being maintained, and the work becomes weakened inasmuch as the glue breaks and leaves the joint open and helpless. Sometimes, when strength is required, a "feather" may be inserted in the mitre; this may be done by making a saw-kerf in the angle and slipping in the kerf a thin piece of tough wood, smearing the piece or "feather" with glue before inserting it in the kerf. For internal angles, it is much better to "cope" than to mitre, especially so if the work relates to putting down base-boards or similar work, and in a future issue we will discuss "copeing and "scribing."

About Tools. A CARPENTER without tools is little more than a cipher, and like a cipher he must depend on his fellow-workmen for value, for standing alone he is almost worthless as a mechanic; he may handle joists, carry timber, or do the work of a laboring man, but as a mechanic he is N. G. In these days of combination tools and sash and door factories, mechanics do not need as many tools as the old-time carpenter did. It is but a few decades since a workman had to have a large chest, and sometimes two, and carry around with him enough tools to stock a modern hardware store; now all that is changed, and the best of mechanics can get along with tools that he can carry on his shoulder. In former days it was an ordinary event to see a good workman possessing tools worth from one to two hundred and fifty dollars; now fifty or sixty dollars wisely invested will supply the best of our workmen with all the tools he may ever require in his regular occupation. A mechanic needs no better recommendation than a good "kit" of tools, well kept and in good working order. It is said that "a workman is known by his chips," and it might have been better said that "a good workman is recognized by his good tools," for they tell more plainly than any written "character" or "testimonial," what their owner is. He may tell you one thing, and yet be something quite the opposite; but a look into his tool chest will betray him. A man who has worked long enough at a certain kind of work to be able to call himself skilled therein, should have acquired all the tools that are necessary, and a man who claims many years' ex-

perience, yet can show but few or inferior tools, should be looked at closely before his statements are accepted as true. Many young men who are working at their trades as apprentices or learners, are unable to purchase tools while in their present position, but they should, if their wages will permit, buy an odd tool now and again. Another way is to lay aside a small amount from each week's wages for the purpose of buying books, trade journals and tools. Divide equally between books and tools, as one is just as necessary as the other; and make a list of what is needed, then purchase the first on the list, as soon as the allotted cash amounts to the sum required. A little judgment will be necessary in the purchase of both books and tools, and it will be well to consult some old workman in whom perfect confidence can be placed. One thing, however, it will always be right to subscribe for, is the journal representing the trade followed, that is published in your own district, province or country; then, if it can be afforded, other current journals may be added. As regards books, there are so many now devoted to the building branches—many of which are first class—that there will be no trouble in making a selection. By following these suggestions a young man will soon own a good "kit" of tools and a valuable and instructive library. Another thing, too, he will have the habit of saving a little money, a habit that will have as much value as his tools.

Staff. MANY plasterers and others who visited the Columbian Exposition in Chicago, were struck with the appearance of the marble-like buildings, and no doubt wondered how the fine white effect was obtained. The material used to accomplish this effect is a peculiar mixture called "staff," but which is little known in America. It is chiefly composed of plaster of Paris and a small percentage of cement, into which are introduced fibres of hemp, jute, sisal grass or other similar substance, to give it toughness, so that it may be bent, sawn, nailed or bored. It is cast in moulds like ordinary plaster; after being wet to the consistency of thick cream or batter, a layer is spread in the well lubricated mould. Next follows a layer of the long tough fibres; over this is poured another coating of the liquid plaster, then another layer of long fibre, and so on until the mould is properly filled to the required depth. In case of statues and statuary groups, the models are first fashioned in clay and coated with staff. Most of the workmen employed on the works of the White City were German, French and Italian, the art and practice of staff-making being understood by but a few people in Canada or the United States. The composition hardens sufficiently to be handled in about ten minutes after it is formed, a quality that is often of great advantage. "Staff" is fire-proof, and, to a considerable extent, water-proof. If kept painted it will withstand the weather for a number of years. If it cracks or crumbles off, it can be readily repaired with a brush or trowel, from a tub of the liquid mixture. For inside decoration it possesses superior qualities and ought to be better known and used in Canada than it is. The ordinary plasterer who is expert in casting ornamental plaster work will find no difficulty in making and manipulating "staff," and the more substantial results will more than repay him for his extra care and trouble. There are a thousand uses to which it may be applied with advantage.

Rights of Canadian Contractors. A RECENT despatch from Montreal to the Toronto World draws attention to an injustice which it is claimed is inflicted upon Canadian contractors in connection with the awarding of contracts by the Dominion government. It is correctly pointed out, that in past years many of the largest contracts have been given to American firms who have no interest whatever in Canada except to enrich themselves by the profits realized from public contracts. On the other hand, Canadian contractors are not only prevented from obtaining United States government contracts by a law which provides that only full-fledged Americans be allowed to tender, but by the alien labor law Canadians are restricted from even obtaining employment without first taking out naturalization papers. A few years ago Major McLennan, M. P. for Glengarry, introduced a bill in the Dominion Parliament to prevent contracts from being awarded to any but Canadian contractors, thereby placing contractors in both countries on the same footing, but he was turned aside in his purpose by the promise of an ex-Minister that he would stipulate that American contractors must employ only Canadian labor. This was not regarded as satisfactory by our own contractors, who hoped for some relief upon the return to power of the present government. This, however is apparently not to be obtained, if we may judge by the provisions governing work for which tenders were recently asked. In the case of the deepening of the St. Lawrence canals, the tenders for each section were to be accompanied by a marked cheque ranging from $75,000 to $150,000. This sum, it is claimed, is beyond all reason, and is the means of greatly reducing competition. Apart from the injustice done to contractors who are perfectly capable of executing the contracts, the country is likely to be called upon to pay higher prices for the work than would be the case were the conditions governing the tenders less stringent. It is urgently to be hoped that the future policy of the present government will be in the direction of fairer dealing with Canadian contractors.

USEFUL HINTS.

PAINT FOR IRON WORK.—The following is quoted by Walter G. Berg in an article in the Engineering News, as being the formula recommended by Dr. C. B. Dudley, of the Pennsylvania Railroad: French ochre, 39 pounds; lamp black, 1 pound; raw lindseed oil, 54 pounds; Japan, 6 pounds.

Ebonising for floors can be easily done says the Plumber and Decorator, by boiling logwood chips in water—one pound of chips to one pound of water—till the liquid is well coloured. Apply this to the floor evenly and carefully, giving a second application if the boards are close textured. When this is quite dry, apply in a similar way a strong solution of sulphate of iron in water. A good chemical ink-like black will be the result, which, after sizing, may be varnished like any other stain, or preferable it may be polished with beeswax and turpentine. The duller surface so given is better, artistically speaking, than the glaring, shining surface given by a varnish, at any rate where a black stain is used.

FRESH CEMENT, TO PAINT OVER.—A contributor to Painting and Decorating recommends that the wall be washed with dilute sulphuric acid several days before painting. This will change the surplus caustic lime to sulphate of lime or gypsum. The acid should be about one-half chamber acid and one half water, but if quick action is wanted 66% acid will answer. This should be repeated before painting, and a coat of raw linseed oil flowed on freely should be given for the first coat. While this cannot be always guaranteed as effectual for making the paint hold, it is the best method our correspondent has heard of for the purpose, and is worth trying when it is absolutely necessary to paint over fresh cement.

PROMINENT CANADIAN CONTRACTORS.

II.

MR. GEORGE E. MILLS.

THE presentation of a portrait and brief biography of Mr. George E. Mills, the well-known contractor of Hamilton, Ont., fittingly serves to continue our series of sketches of Canadian contractors. Mr. Mills has for many years been prominently connected with the building trade in Hamilton. He was born in Iron Acton, Gloucestershire, England, on the 25th of June, 1849, and commenced work with his father and two brothers, who conducted business as tilers, plasterers, masons and bricklayers combined. In 1868 he removed to Aymesbury, where he worked for two years as journeyman, at the end of which time he formed a partnership with his elder brother as contracting plasterers. The arrangement, however, proved unsatisfactory, and the subject of our sketch resolved to seek his fortune in America.

Arriving in Hamilton on August 3rd, 1871, Mr. Mills obtained employment for a time as mason with Mr. John Taylor. A year later, when Mr. J. Beer

MR. GEORGE E. MILLS.

commenced contracting, he was engaged with him as an improver at bricklaying, and afterwards as foreman for the late Mr. Andrew Tindall. From 1874 to 1891 he had full charge and management of Mr. Beer's business, and upon his death in the latter year assumed the business himself.

Among the principal buildings with which Mr. Mills was connected in earlier years may be mentioned the Hamilton Hub Works, Copp Bros.' four story building, the Cannon, Hess and Queen Victoria schools, the Wesley, Gore, Simcoe and Hannah street Methodist churches, opera house, hospital, the Y.M.C.A. and the Free Library buildings. Since contracting on his own account, he has built, among other works, the Hamilton power house, Wood, Vallance & Co.'s warehouse, the Sophia street school, Toronto, Hamilton & Buffalo railway station, the power house at the Beach, addition to St. Joseph's hospital and convent, and remodelled the cotton mills. He has now in course of construction the Grand Trunk car shops at London, for which he was given the entire contract, estimated at $100,000, sub-letting the carpenter work, plumbing, painting, galvanized iron and slating. Work was commenced on the first of October last, and nearly the whole building is now ready for the roof.

MANAGEMENT OF WATER BACKING THROUGH HOUSE DRAINS.

WE illustrate herewith an arrangement for the management of water backing through house drains into cellars, which is liable to occur in low and flat towns, and to generate an intolerable nuisance. The method was designed and carried out in Croydon, England, by Mr. T. Walker, an engineer of that town. The description of it was first printed in The Surveyor, London, whence it has been copied into Domestic Engineering, (October). The method seems simple and feasible, and worthy of a place among appliances for the sanitation of dwellings.

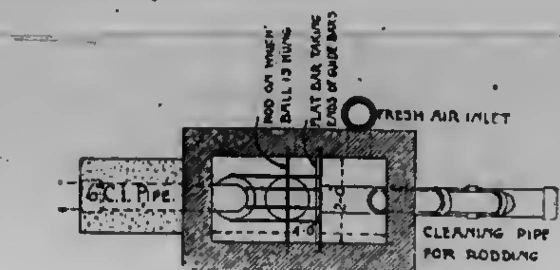


FIG. 1. PLAN OF MAN HOLE.

Fig. 1 shows the plan and Fig. 2 the sectional elevation of a man-hole chamber receiving the drainage of four houses through a 6-inch cast iron pipe, delivering downwards; it is arranged to receive a stout rubber ball, fastened to a chain and arranged so as to

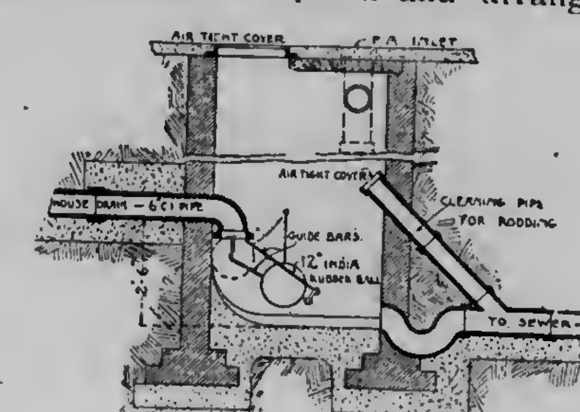


FIG. 2. SECTION OF MAN HOLE.

find a seat at the mouth of the trap when water backs up through the sewer. The ball is lifted by the water and forced by guide bars to its seat. These guide bars are shown in detail in Fig. 3. Fig. 4 shows the position of

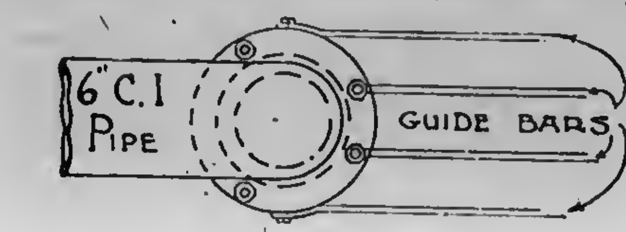
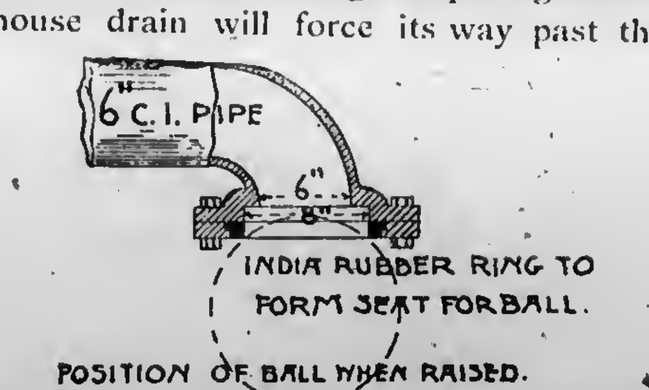


FIG. 3. DETAIL OF GUIDE BARS.

the ball when raised. No further description is needed to explain the action. The chamber receives all the back water, while the drainage acquiring a small head in the house drain will force its way past the rubber



SECTION.

FIG. 4. SHOWING THE BALL RAISED.

ball valve and into the chamber, passing thence into the sewer. Of course proper care must be exercised in constructing the chamber or cistern, which should be proof against leaking; otherwise there will simply be the substitution of one nuisance for another.

WHAT THE FIGURES ON A CARPENTER'S SQUARE MEAN.

The following question and answer take rather too much space for the regular department of queries, and we therefore print it as a separate article.

H. S. F., New Decatur, ———, writes: "On a carpenters' square that I have there are certain figures located between those which represent inches, but I do not understand what they mean, nor do I know anyone that does. Will you please explain them?"

ANSWER.—We do not know just what kind of a square you have, but will explain one that may be like it. The large part of the square two feet long is the body and the short part is the tongue. The side on which the name of the maker is stamped is the face, the reverse side is the back. On the back of the body is a table giving the measure of lumber, or boards 1" thick, a section of which is illustrated in Fig. 1. To

9		1	0	1	1	1	2	1	3	1	4
6		6	8	7	4	8		8		9	4
6	9	7	6	8	3	9		9	9	10	6
7	6	8	4	9	2	10		10	10	11	8
8	3	9	2	10	1	11		11	11	12	10
9	9	10	10	11	11	13		14	1	15	5
10	6	11	8	12	10	14		15	2	16	4
11	3	12	6	13	9	15		16	3	17	6

FIG. 1.

use it proceed as follows: Suppose that you have a a board 2' long and 9" wide, and wish to know how many feet there are in it. The column under the figure 12 represents the length, while the other figures to the right and to the left of it stand for the width of the board. Looking down the column underneath the figure 12, we find the second figure is 9, and as 2 represents the width of it, we find it one column to the left Then with our pencil we begin at the 9 and follow

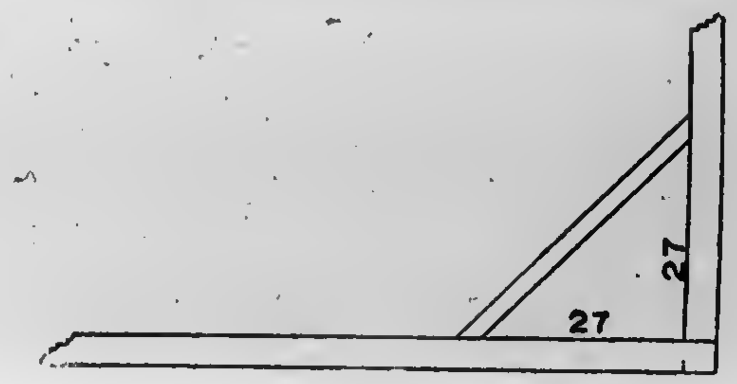


FIG. 2.

the space until we arrive at the 2 column, where we find 8' and 3", which is the number of feet in the board.

Again, suppose that we have a board 14' long and 14" wide. In the twelve column find the 14 and pass the pencil to the right until we arrive at the 14 column, where we find 16' and 4", which is the correct measurement.

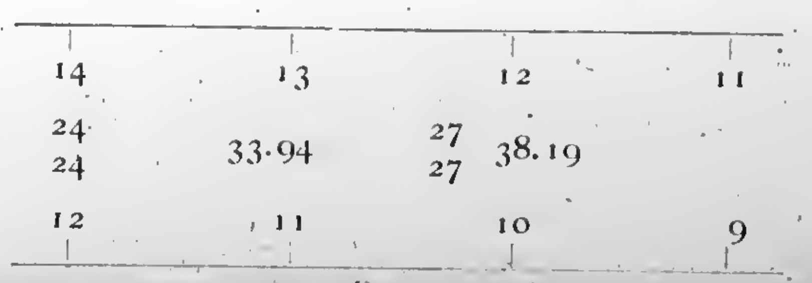


FIG. 3.

On the back of the tongue may be found what is called "brace measure." It is used as follows: Suppose that you have a horizontal timber into which you wish to frame an upright post. You expect to put the brace 27" from the angle on the post, and also 27" on the horizontal timber. See Fig. 2. It is desired to know the length of the brace. Refer to the brace measure, a section of which is shown in Fig. 3, and to the right of 27 you will find 38.19, which is the length

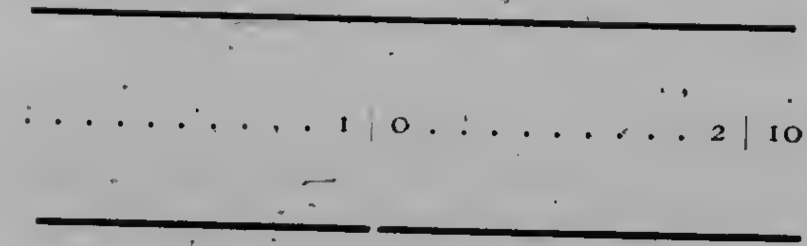


FIG. 4.

of brace. It may be proved as follows: Square each of the given distances, add them together and extract the square root of the sum.

Thus, $\sqrt{27^2 + 27^2} = 38.19$.

Again, on the face of the tongue may be found some spaces and figures, a part of which are illustrated on Fig. 4. Only every tenth space is numbered. These are given for the purpose of showing how to cut an octagon stick of timber out of a square one. Suppose that we have a stick that is 12" square, as shown in Fig. 5. We draw the lines A and B through the centre as shown, and as our stick is 12" square we take our

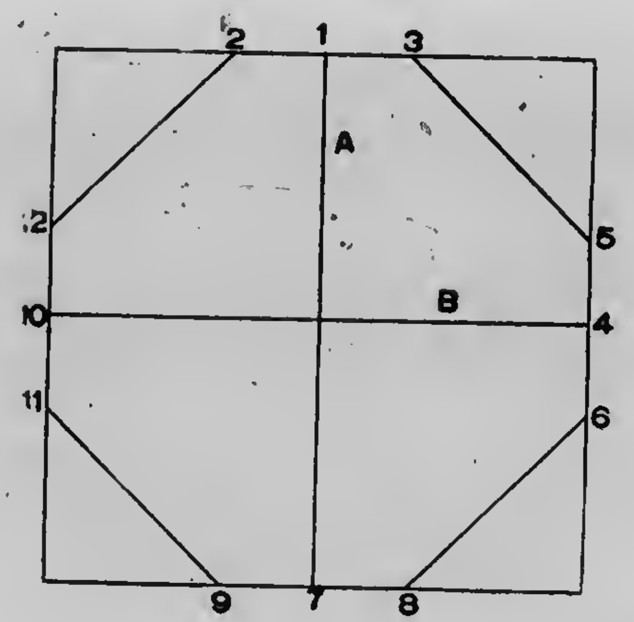


FIG. 5.

dividers and measure off 12 spaces on our scale, Fig. 4. Then putting one point of them on 1 we make the mark at 2, and then the mark at 3. Next start at 4 and put down the marks 5 and 6. Then from 7 mark 8 and 9. Then from 10 mark 11 and 12. Now when we have drawn the lines shown, it tells us just how much to cut off to make the 12" stick an octagon.

LABOR UNION SUED.

An action involving the right of a labor union to suspend a member and boycot him has been entered at Ottawa. The plaintiff is R. Beaulieu, stonecutter. His action is to recover $2,000 damages from the officers of the Rockland branch of the Stonecutters' Union for alleged illegal suspension from that branch. Beaulieu's suspension took place about two years ago during a strike among the stonecutters at Rockland. The strike arose over trouble with the contractor, Mr. Arch. Stewart, of Ottawa, over an apprentice who was set to work with Beaulieu. The workingmen claimed that more than the right number of apprentices were at work, and when the contractor refused to remove the young man Larocque, the men, including Beaulieu, went on strike. The trouble extended over a few days, and was finally settled, but in the meantime Beaulieu was accused by the union of treachery and connivance with the contractor to keep Larocque at work, and at a meeting of the union a fine of $150 was placed on Beaulieu. Until this was paid he was placed under suspension. He did not pay the amount. His case was published in all the craft papers, and he has since been prevented from obtaining work in any union towns. Beaulieu asserts that he acted during the strike like an upright union man, and that there was not the least reason for his suspension. Damages to the amount of $3,000 are asked.

WORKING IN STONE.

The quarrying and working of stone is one of the earliest industries in which men engaged, and very little experience would make known the fact that certain stones possessed rich colouring and veining, which was made apparent when surfaces were rubbed smooth; and so the first work in marble would be produced.

The introduction of the mallet, the chisel, and the drill is lost in antiquity. These tools were in use at the most remote period of which we have any record. The sculptures of Egypt are the oldest which the world possesses, dating as far back as 3,000 B.C. Many of these were not only shaped by the chisel, but they were polished with great care. The rude limestone blocks which now form the steps of the Great Pyramid were at one time concealed from view by a casing of polished marble, which must have given the great pile an appearance of dazzling brightness.

We learn from Herodotus that it was built in steps, every step forming the scaffold for the next until the top was reached; then the finishing process was commenced from the top downwards by fitting in angular blocks of marble and polishing the surface to a perfect level.

Saws without teeth, fed by hand with sand and water, were used to cut the slabs with which the walls of the palace of Mausolus at Halicarnassus were lined. Pliny describes the saws and the kind of sand with which the slabs were sawn, and speaks of the palace as being encrusted, or veneered throughout, with marble. It was built 350 years before the Christian era. Saw mills for sawing stone, driven by water power, were in use on the River Roer in Germany in the fourth century. Very little progress appears to have been made in this direction, because we find as lately as the early part of the sixteenth century that one of the inventions of Leonardo Da Vinci was a marble saw, which consisted of a frame in which two or more blades of iron were stretched, thus forming a gang. A copy of Leonardo's original design was published in Scribner's Monthly Magazine some few years ago. According to an English building journal the honor of first establishing in Great Britain mills for the sawing of marble by means of water power, and on an extensive scale, belongs to Mr. William Colles, of Kilkenny. About the year 1730 he tried a model in a small stream, and finding it succeed, took a perpetual lease of a marble quarry in the neighborhood, and set up a mill, which is still in existence, and worked by his descendants. A few years afterwards (in 1748) machinery for sawing and polishing marble by means of water power was established at the village of Ashford, near Bakewell, in Derbyshire. Since that time a great many improvements in the details of sawing machinery have been introduced, but the arrangement sketched out by Leonardo Da Vinci remains practically the same, and is in general use to-day. The principal improvements have been: An arrangement by which sand and water has been fed to the saws automatically, and variations of a clock-work mechanism, by which the saws are gradually lowered into the cut, and which can be made to work faster or slower, according to the hardness of the stone to be sawn. Perhaps the best sawing machine for general purposes is that invented by Mr. Richard Cox. The great objection to the ordinary type of machine is that it takes up too much room; a long shaft is employed to connect the frame with the crank, and this, together with the length of the saw frame itself, takes up a space which can sometimes be ill afforded. In Cox's machine the connections are fixed to the centre of the frame, instead of at one end of it, and the whole of the driving gear is fixed to the machine itself, so that there is no thrust, and no vibration. The whole of the mechanism of the saw being contained in one framing, the weight of the block of stone to be sawn is ingeniously brought into service, and keeps the machine perfectly steady while it is in work.

An altogether different principle had its origin in Belgium. The machine is called the Helicoidal saw, and is said to produce the most wonderful results. It consists of an endless metallic cord made of three steel wires twisted together to a particular pitch. The cord is carried round two grooved pulleys and is drawn through the cut. It is supplied with sand and water, as in the ordinary saw. Besides the running movement the cord receives a rotary motion which continuously throws the mud produced by the sawing out of the cut. The result of the simultaneous running and rotary movement of the cord is that the sand is rapidly carried along the line and over every point in the cord made by the twisted wires. This combination joined to the continuous movement gives great rapidity of work. The machine has sawn through a surface of 150 superficial feet of white Carrara marble in twelve hours, and through 15 superficial feet of hard Brittany granite in the same time. It has not yet been introduced into this country, but if actual working proves the truth of the experiments made by the inventors, it should not be long in coming into active service. It has already found employment in several of the Belgian quarries.

When marble comes from the saw the surface has yet to be smoothed and polished. It is first rubbed with fine sand, then gritted or pumiced, and finally polished by means of a block on which putty powder or lead has been laid. The machines employed in Italy for surface rubbing are of very rude construction. A bed of thick marble slabs is first laid down in a circular form, and a large wheel-shaped framing of wood divided by spokes into four or five compartments, is made to revolve over it. The slabs of marble to be rubbed are placed in the compartments, sand and water is thrown on the bed, and the revolving wheel is set in motion. As it goes round it carries with it the slabs, which are thus rubbed on those below, until the requisite fineness of surface is produced.

The rubbing bed principally in use in this country is of cast iron. A plate of this material, some 2 inches or 3 inches in thickness, and 8 feet to 10 feet in diameter is made to revolve quickly, and carries on its surface the sand and water required. The slabs are placed face downwards on the plate, and the required work is speedily and easily done. Another machine for rubbing large and heavy pieces of stone consists of a heavy iron plate 8 inches to 12 inches in diameter pierced with holes, and made to revolve by connection with a vertical shafting. The sand and water is placed inside the plate, and finds its way out through the holes upon the work below; the weight of the revolving plate does the rest.

Numerous plans and all sorts of extraordinary materials have been used and recommended for speedily polishing the sanded surface of marble. Practical experience proves that nothing in this process will take the place of good, honest, hard rubbing. This can be best

applied by means of a very simply contrived machine. A crank is connected with a fly wheel, and works an iron framing backwards and forwards, forming a rocker. To the rocker is fastened a shaft, which is connected to a large block covered with felt, on which putty powder or rouge and water has been sprinkled. The block is dragged backwards and forwards over the surface of the marble, and in no other way can a good lasting polish be produced. Acids are frequently employed to get up a superficial polish, but this method is utterly destructive in its results. A very short space of time is required for the acid to eat away into the surface of the marble and a dull speckly appearance is produced. No acid should be brought into contact with marble in the working, on any pretence whatever.

Numerous machines have been invented for the purpose of carving; but as far as carving in the round is concerned, their history has been nothing but a history of failures. All of them seem to have been on much the same principle. Two or more points were fixed in a frame, which could be moved in every direction. One point was fixed; the others were made to revolve at a high degree of speed. They were all so arranged in the frame that the position of each was always the same in relation to the other. The manipulator placed a piece of finished carving under the stationary point, and as many rough blocks of stone as he wished to make into copies, one under each of the revolving points or chisels. As the stationary point was passed over the surface of the finished carving, and raised, or lowered, as it was brought into contact with each portion of it, so the revolving chisels followed the position of the stationary point over the model, and cut away the stone placed underneath them into a corresponding shape. In some of these machines the table itself moved as well as the frame, but in all of them some modification of the same plan was adopted.

Mr. Gerald Lomer, 43 St. Sacrament street, Montreal, has recently received the Canadian agency for Otis Bros. & Co.'s elevators, Richey, Brown & McDonald, Brooklyn, Ornamental Iron Workers, and Dexter Bros., Boston, shingle stains.

The Fort Erie Jockey Club are about to constrnct a large track and grand stand at Fort Erie, Ont., the contracts for which have recently been let. The grand stand will be 311 feet long by 115 wide. There will be eighteen terraces of seats with folding chairs. In the front of the stand there will be twents-four boxes, each containing eight chairs. The buffet will be forty-five by fifty feet, and the restaurant thirty-six by fifty feet. The house of the superintendent of the track will contain eight rooms. Underneath the stand will be the betting ring, which will be two hundred and ten feet long by sixty-eight feet wide. This will have an arched roof, thus doing away with columns.

REPAIRING FRESCO PAINTINGS.—The old fresco paintings are to be washed off with clean water. If this does not remove the dirt sufficiently, a little hydrochloric acid should be added to the wash water, but it is better to rinse off two, three and even four times with water containing too little of the acid than to spoil the picture altogether by using too much acid. After washing off with the hydrochloric acid water, the painting should be rinsed off twice with clear water. If it has to be painted over in places, only lime-proof colors should be used. These are ground in lime-milk diluted and mixed with finely powered sharp sand immediately before use, and should not be applied too thin upon the wall, which is moistened previously. The wall, upon which the painting has been done, should also be kept moist for some time yet, for only as long as the mixture is wet, the lime will enter into an intimate combination with the sand. For this purpose a wooden frame is made around the picture, upon which, in a little distance from the picture, firm sack cloth is stretched, preferably double, before the whole picture, so that no air can strike the picture directly. The sack cloth should be kept quite moist for two to four days.

NEW PLUMBERS' ASSOCIATIONS.

THE master plumbers of Stratford and vicinity have shown themselves to be in accord with the objects of the Dominion Master Plumbers' Association, and on March 3rd a meeting was called by Mr. Wm. Smith, vice-president of Ontario, for the purpose of organizing a local association for that district. The following were enrolled as members: J. A. Castlake, A. Ward, A. Smith, F. Sylvester, and McDonald Bros., of Mitchell. The officers elected were: President, J. A. Castlake; 1st vice-president, A. Ward; 2nd vice-president, A. McDonald; secretary-treasurer, A. Smith; sergeant-at-arms, F. Sylvester.

The master plumbers of Winnipeg, Man., met on the 20th of March and organized a local branch, to be known as the Master Plumbers' Association of Winnipeg. It comprises eight out of the nine established plumbing firms doing business in the city, and starts out with good prospects of becoming an active and useful organization. Officers were elected as follows: President, T. A. Irvine, of T. A. Irvine & Co.; vice-president, T. Cotter, of Cotter Bros.; recording secretary, Jos. Turner, of the Manitoba Plumbing Co.; treasurer, W. Stephenson, of Stephenson & Co. Committees on arbitration, legislation, sanitation and auditing were also appointed, and the constitution of the Montreal Association was adopted, with the necessary changes to apply to the city of Winnipeg. A meeting will be held shortly, when a regular meeting night will be arranged.

The officers of the new association at St. Catharines, Ont., the organization of which was briefly mentioned in our March number, are as follows: A. Chalfield, president; A. Riddell, 1st vice-president; S. P. Gourlay, 2nd vice-president; T. Parnell, treasurer; C. Beard, secretary; T. Patrick, sergeant-at-arms; H. Bald, associate member on committee.

L. H. Gaudry has started business in the city of Quebec as a dealer in plumbers' supplies.

Mr. J. W. Hughes, of Montreal, who was one of the promoters of the Dominion Master Plumbers' Association, was, at the last meeting of the American Public Health Association, appointed chairman of a new committee on "Sanitation, with special reference to drainage, plumbing and ventilation of public and private buildings." Mr. Hughes has always taken an active interest in sanitary matters, and fully deserves the honor conferred upon him.

SALT IN SAND.—A writer in one of the London architectural papers presents some interesting remarks relative to methods by which salt may be detected in sand. He says that if the sand is not contaminated with decaying organic matter the easiest way is undoubtedly to put a few grains in the mouth, or to taste the water in which some of the sand has been stirred. If this test is objected to put some of the sand in a wine-glass, cover with distilled water, and, after agitating for some time, dip a piece of clean platinum wire into the water and hold it in a colorless Bunsen gas flame. A persistent deep yellow color imparted to the flame will indicate the presence of sodium. Another method is filter off the water from the sand by means of blotting paper, and to the liquid add one drop of silver nitrate solution. A curdy white precipitate will at once betray the presence of common salt. In ascertaining the presence of salt in sand, it is assumed that the object is to discover any tendency to absorb moisture, and consequently to cause damp walls. This could be equally well ascertained by drying some of the sand for some hours at a temperature of 212° F. Its weight should then be accurately taken and the sand exposed for some days to a moist atmosphere. Any increase in weight at the end of the period would be due to water absorbed from the air, probably owing to the presence of common salt.

PRESIDENTS OF CANADIAN PLUMBERS' ASSOCIATIONS.

MR. R. SAMPSON.

THE ancient city of Quebec has quite an active plumbers' association, of which Mr. R. Sampson, whose countenance is herewith portrayed, is president. Mr. Sampson's father was a Devonshire man, who arrived in Quebec in 1832 to accept a position as master armorer in charge of the small arms department and citadel armory, in connection with which there were many interesting associations, such as the rebellion of 1837, the coming and going of the troops, etc. He occupied this position for forty years, and died at the honorable age of 85.

The subject of our sketch is 57 years of age, and was apprenticed to learn the brass trade with C. Pardie when thirteen years old. At the death of Mr. Pardie five years later, he secured employment with the late John Pye, well-known to the older plumbers of the province. That was the time of big margins, when plumbers were regarded as superior to ordinary mortals

MR. R. SAMPSON,
President Quebec Master Plumbers' Association.

and feared for their ability—to make bills and collect them. Then there was no trouble with the apprentice question, as there was always some hand work to give them employment between times, and better opportunities were afforded to become lead workers than at present, with our superior machine-made lead work. By casting on sand tables many tons of sheet lead were manufactured, from which soil pipe, traps, bends, etc., were made in a manner unknown to the present trade.

In 1866 Mr. Sampson went to New York, were he was employed for one year at brasswork and plumbing. Returning to Quebec, he commenced business on his own account in 1868, and has continued ever since. He has spent much of his time in working on patent models for different clients, which has given a great variety of work. In his business he is ably assisted by his son, who has charge of the brass shop, while his daughter assumes the responsibility of the office work. Mr. Sampson has accumulated considerable wealth by strict attention to business, but has nevertheless found time to participate in an occasional hunting and fishing tour.

Upon the formation of the local plumbers' association two years ago, Mr. Sampson was chosen president, a position which he still occupies. He reports the association to be in a good condition, and although some of the local firms have not yet joined, it is hoped they will be induced to follow in the footsteps of the majority.

LONDON PLUMBERS' ASSOCIATION.

MR. W. Heard, president, sends the following encouraging report of the local plumbers' association at London:

I can report the London Association to be in first class working order. All the members are fully alive to the benefits of their connection with the National Association of Master Plumbers, and the manufacturers and wholesale dealers are realizing the benefit that comes to them by standing true to the association.

The plumbing trade here, for the last four months, has been very dull, but there are indications of an improvement. The local association membership has been increased by the addition of Messrs. Noble & Rich, who have lately commenced business here, and being well-known, practical men, will get their share of the trade.

A decided improvement is noticeable in the feeling of the individual members of the trade, one to the other, since the association has been formed, the old-time jealousy being displaced by frankness and fair dealing. That augurs a new era.

An invitation has been received from ex-President Haslett, to celebrate the birthday of the local association and a pleasant time is anticipated.

MANUFACTURES AND MATERIALS

ROOFING TILES AND THEIR MANUFACTURE.*

By C. W. CRAWFORD.

Tilemaking, next to brickmaking, is the greatest of the clay industries in other countries than this. The roofs are universal in all of Continental Europe, and are much used in the British Isles, where slates are so plentiful. All of the known varieties may be found in any of the old cities, from that resembling a drain tile split in two, or that having a reverse curve like a letter S, or the flat shingle tile, among the older styles, to the modern interlocking tile now in exclusive use. The fashions in these tiles vary so greatly that the idea of a patent tile in this country is absurd. The tribe is so numerous and so venerable that it is difficult to conceive of any new thing on this side that is not in use on the other. The underlying principle of them all is the same—that of a tongue and groove, arranged with the groove facing upward and the tongue of the opposite tile fitting loosely into it. This is the single lock, and is the more common. But some are made with two tongues and two grooves, called a double lock. This latter plan is more secure against wind and fine snow, but having greater lap, they are necessarily heavier, but both kinds are water tight if of good quality. No tile roof is air tight, and the ample ventilation they admit of is considered an advantage in making the house cooler in summer without being colder in winter. Some of the old pan tiles of S shape are laid with cement, and are fairly tight, but the expansion and contraction must inevitably crack the cement. It is the common practice now to lay tiles as they come from the factory, without cement, except in fitting ridge tiles and hip rolls.

Tiles are held on the roof mainly by gravity, by being

* Abstract of paper read before the Ohio Clayworkers' Association.

made with a nib on the under side that hooks over the slat on which it rests. These nibs are usually punched for nails while the tile is soft in such a way that the nails are driven into the upper edge of the slat. Some tiles have no nail holes, but, instead, a nib on the bottom, near the lower end, punched for a wire, and it is not considered necessary to wire every tile, but only a few scattering ones. Some are made with nibs to hook on the slats, but none for wires and no nail holes, depending upon gravity alone to keep them in place. It is not necessary to use solid sheeting, but only slats three inches wide. But in the case of an old roof already sheeted, solid narrow slats, one-half inch thick, are nailed on top of the sheeting on which to hang the tiles.

Almost any clay that will make good brick or drain tiles will make good roofing tiles, but it is essential that it shall dry straight and without cracking. Most kinds of clay will do, but there are kinds that appear to be first-class that cannot be dried without going to pieces. A specimen of such clay was sent to our firm for trial from Minnesota, from which we never got a whole tile, but the pieces burned to a fairly good red. Other specimens we have had that would dry over the boiler or anywhere. Common surface clay is more liable to crack than others, but when mixed with, say, 20 per cent. of shale or fire clay it generally works well and dries almost anywhere, and may be considered an ideal clay for tile-making. The admixture of shale reduces the usual red color, which is its only fault. Pure fire clay or potter's clay makes excellent tiles as far as quality goes, but the color is bad. These are good if treated with a slip of some kind or with pigment ground in the clay. Anyway, fire clay can be relied on not to warp or crack, and to stand a very high heat, which shyle or surface clay will not. For bluesmoking almost any clay can be used, but the better the clay the better the tile, and hence fire clay or some mixture of it will make better blue tiles than any other, and the danger of over-burning is a small factor. Bluesmoking is an excellent means of disguising under-burned tiles, they all come out one color, and the bad ones look as well as the good ones, but that need not mitigate against the process, which is an excellent one if the ware is burned properly. In preparing the clay for tilemaking it is important that it shall be ground and screened finely, using a No. 20 or 24 screen, and thoroughly pugged and worked through an auger mill into slabs a little less in area than the tile—say one inch less at each side, one-half inch less at each end, and thick enough to contain a little more clay than the tile. The surplus overflows, and a fin is left around the edges that must be trimmed off. The pressure is not necessarily very great, and as the press runs almost idle during its revolution, except at the point of greatest pressure, it will be seen that very little power is required.

The Queenston Quarry Co., of St. David's, Ont., is seeking incorporation, with a capital stock of $50,000.

The works of the Standard Drain Pipe Company at St. John's Que., have been closed down pending a decision by the government regarding the duty on drain pipes.

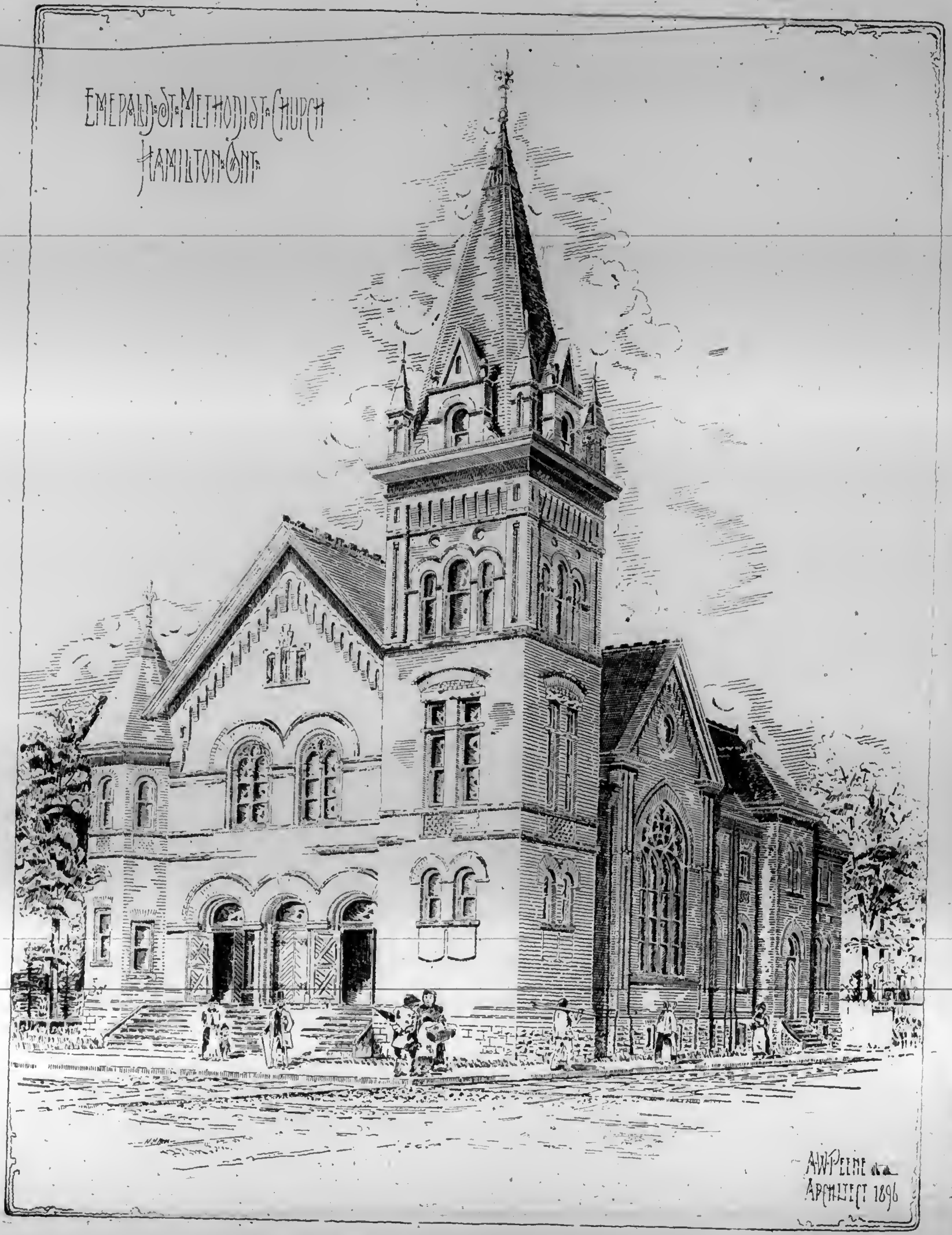
Steps are being taken to form a joint stock company to carry on the business of manufacturing sanitary goods hitherto conducted by Messrs. Dakin & Co., at Iberville, Que.

A very simple remedy to remove rain spots, or such caused by water soaking through ceilings, has been employed with good results. Take unslaked white lime, dilute with alcohol, and paint the spots with it. When the spots are dry—which ensues quickly, as the alcohol evaporates and the lime forms a sort of insulating layer—one can proceed painting with size color, and the spots will not show through again.

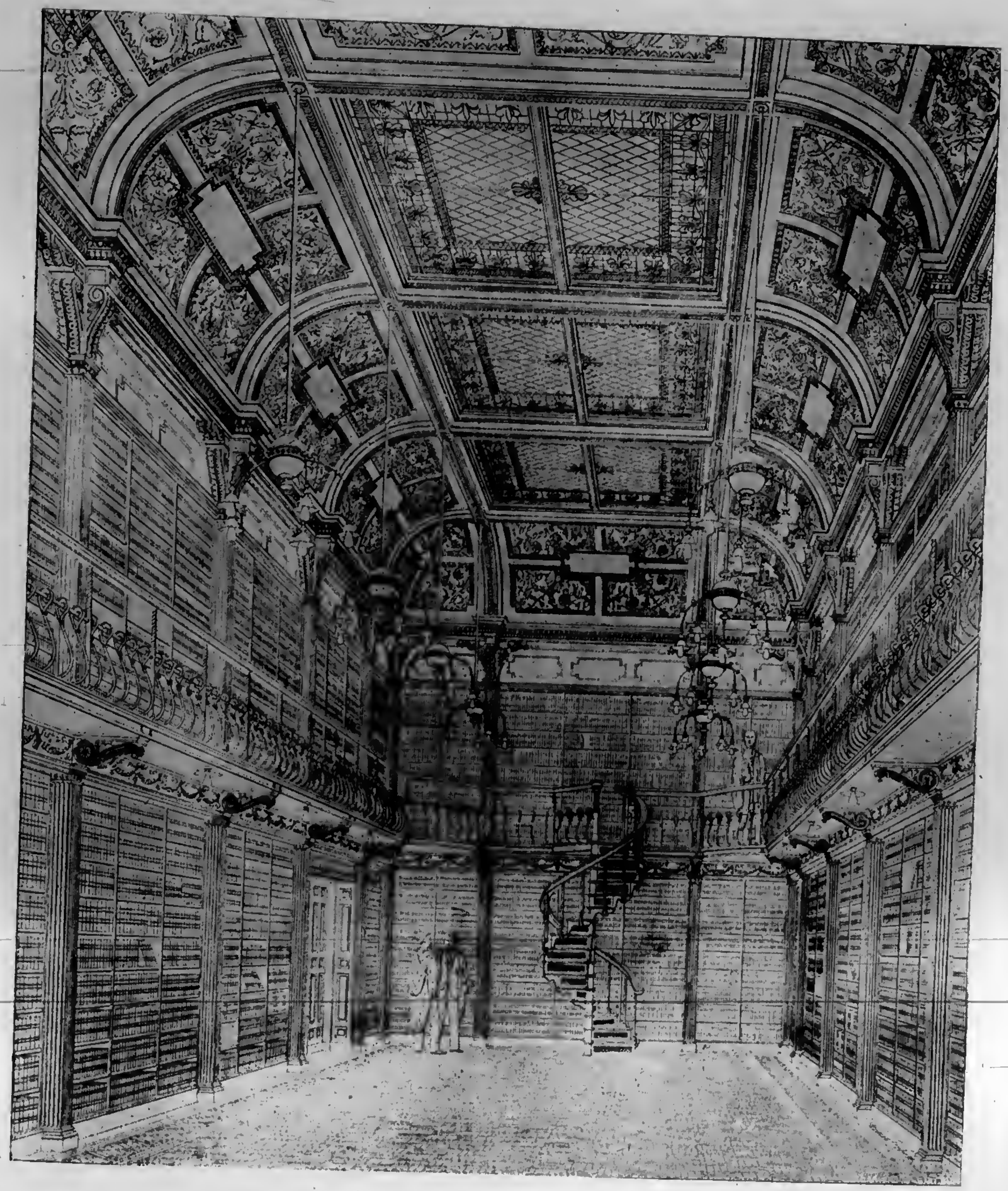
In a recent decorated library, the walls have been wainscoted about five feet high, where the low, open bookcases do not occupy the wall space, and all the oak woodwork has been stained a forest green. Above this a damask pattern paper, in two shades of dark green, has been used, running to the ceiling without a frieze, and separated from it simply by a narrow picture molding. The ceiling is a pale green, with stenciled Empire border in a slightly darker shade. The hangings are of green figured denim, and the Smyrna rug on the floor carries out the same color scheme. Relief is afforded by the bright colors of the Liberty velvets that have been used to upholster the quaint-shaped chairs, and the bright cushions that are piled upon a divan in the window seat.

SCREWS IN STONE WALLS.—A Dusseldorf engineer, knowing from experience that wooden dowels for the purpose of securing screws in stone are apt to weaken the walls and do not afford the desired solidity, has devised an ingenious method of obtaining a firm anchorage. For this purpose a wire of suitable thickness is coiled onto the screw, so as to follow the threads of the same and to form a kind of screw nut. The coiling may commence near the head or thick end of the bolt and proceed toward the point by laying the wire into or between the threads, so as to touch the bottom of the same, the section of each screw thread being perfectly triangular or trapezoidal and the core of the screw conical (similar to a wood screw). After arriving at the point of the screw, the wire may be wound backward over the helix already wound on, but with a steeper pitch, so as to leave wider interstices between consecutive convolutions of the wire. After the wire has been laid on so as to form a nut, and then the screw withdrawn, the nut or wire coil is introduced into a hole which has been drilled or otherwise formed in the wall for this purpose, and which is slightly wider than the diameter of the nut measured over the outer layer of the wire, after which the interstices are filled up with plaster of Paris cement, or similar binding material in a plastic condition. When the said binding material has become sufficiently hard and firm, the screw bolt which has served as a core, or another screw bolt having the same diameter and pitch; is screwed into the wire coil, and may now be screwed out and in repeatedly without damaging the wall, because the wire serves as a screw nut, which is secured to the stone or wall by the cement or other binding material.—Philadelphia Record.

CLUB HOUSE OF THE VICTORIA YACHT CLUB, HAMILTON, ONT.
A. W. PEENE, ARCHITECT.



EMERALD STREET METHODIST CHURCH, HAMILTON, ONT.
A. W. PEENE, ARCHITECT.



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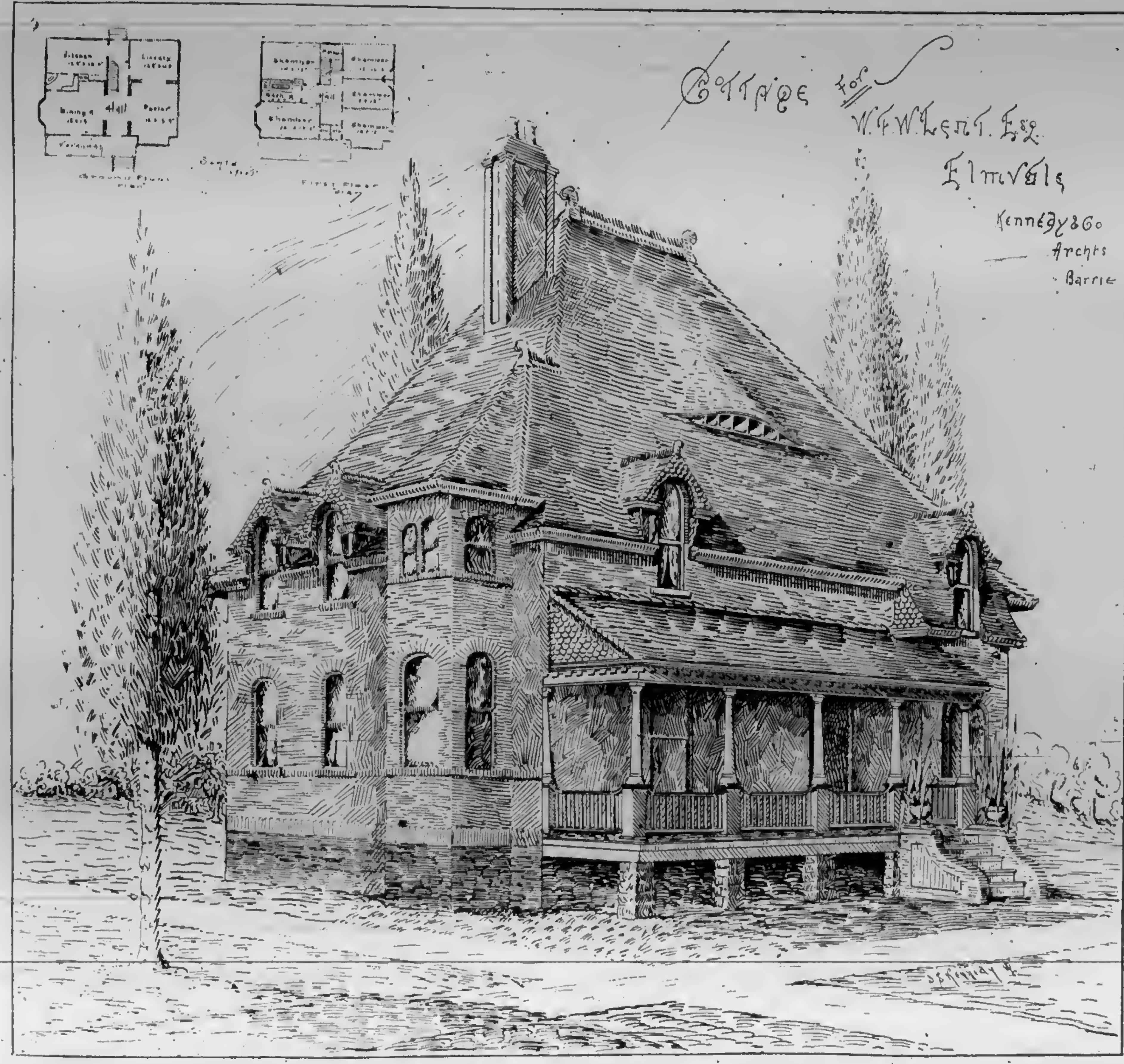
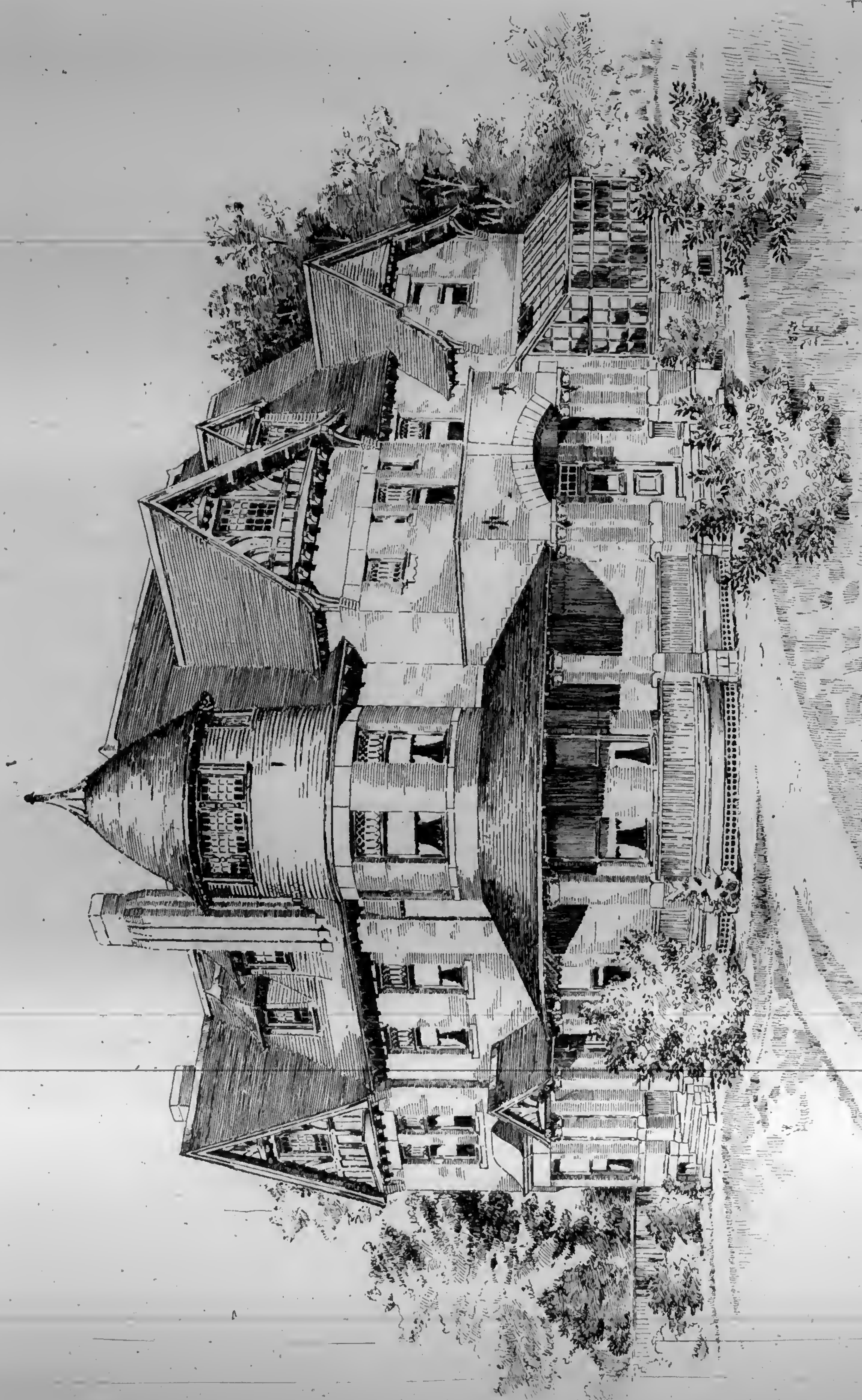


Cottage for Mr. F. W. Lent, Elmvale, Ont.
Kennedy & Co., Architects.



Residence at Montreal.—R. Findlay, Architect.

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TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Retirement of Mr. Fuller.

ADVERTING to the reference contained in our last issue regarding the superannuation allowance of Mr. Thos. Fuller, late chief architect of the Dominion Public Works Department, it has since been learned that it is not Mr. Fuller's intention, as stated in that article, to bring up in Parliament the question of his allowance. We cheerfully make this correction lest the publication of the statement should in any way prejudice Mr. Fuller's chances of receiving an allowance commensurate with his lengthened and valuable services.

Queen's Park Improvements.

THE City Council and citizens of Toronto are to be congratulated upon the transformation which is being effected as the result of recent expenditures for the improvement of Queen's Park. As the site of the Legislative and several university buildings, and surrounded by handsome residences, this park is visited by most travellers who come to the city. It is therefore an important factor towards enhancing or retarding the city's fame. For a number of years past, its condition has been little better than a common, and in consequence the city's reputation has suffered. Last autumn the City Council was induced to appropriate twenty-five or thirty thousand dollars for the improvement of these public grounds. Under the direction of Ald. Hallam, Chairman of the Parks and Gardens Committee, and Mr. Chambers, Superintendent of Parks, this money is apparently being laid out to good advantage, and the park is beginning to assume an appearance which is creditable to the city and in keeping with the character of public grounds in the large cities of America and Europe. It is to be hoped that the citizens will heartily co-operate with the authorities in enhancing and maintaining the beauty of these and other public grounds throughout the city.

Decoration of the New City Buildings at Toronto.

THE City Council of Toronto have declined at present to accept the offer made on behalf of various art societies of a scheme of mural decorations for the new city buildings. Several well known artists, selected by these societies as competent to design and execute work of this character, at the expense of a great deal of thought and effort have elaborated a scheme of decoration which is intended to be illustrative of the history of the city and province. The purpose is that this scheme should be carried out gradually, by native artists, in

such a way as to form when complete an harmonious whole. An offer was made to the Council to execute a first instalment of the scheme, viz., the Council Chamber, entrances, etc., at a cost slightly exceeding what would be required for decorative work of an ordinary character. It is to be hoped that the proposal of those who have this undertaking in hand may yet be accepted and carried out. The time has come when Canadians should, as far as their resources will allow, exercise regard for what is aesthetic as well as what is purely utilitarian. We are rapidly making history, and it is due to our future greatness and the interest of coming generations that the notable events of the past and present should be perpetuated in our public buildings and monuments. Only once or twice in a century are buildings of such importance as these likely to be erected, and the opportunity should not be allowed to pass of making them an object of the greatest possible interest. Probably in no other way could this object be better fulfilled than by the proposed series of historical paintings.

Building in Toronto.

BUILDING operations in Toronto give promise of being on a more satisfactory scale than there was reason to anticipate earlier in the season. In contradistinction to last season there is comparatively little work being done on the line of erecting new or repairing old business premises. The concentration of business due to the development of departmental stores, has been an important factor in restricting expenditure for alterations and repairs to store property. The bulk of the work in progress this year relates to the construction of new residences of a substantial charactor, which in most instances are designed to be occupied by the owners. The prevailing low price for real estate, building materials and labor, has no doubt had a considerable influence towards inducing those who have the means to erect for themselves homes suited to their tastes and requirements. The present cost of building is stated on good authority to be from one to four cents per cubic foot less than the ruling figures of six or seven years ago.

An Apartment House for Toronto.

A PROPOSAL has recently been made looking to the erection of an apartment house on the lines of those which have been built in New York and other large American cities. Articles have recently appeared in the newspapers in which the opinion is expressed that there is pressing need for such a building in Toronto. The writers state that the cost of living could be greatly reduced by means of this Bellamy plan as compared with the present method of each family occupying and maintaining a separate establishment. There is doubtless some ground for this contention, but those who advance the argument have either overlooked, or have purposely kept in the background the many disadvantages of living in apartment house flats as compared with individual houses. The high average of health and comfort which prevail in Toronto to-day is due in large measure to the fact that it is a city of individual homes, and that surrounding each home is sufficient open space to afford recreation for the children and fresh air for all. We do not believe that any considerable number of the citizens will attempt to effect a small saving in cost of living at the expense of present advantages. The meagre attendance at the meetings called by the promoters of the apartment house enterprise appears to bear out this view of the case.

ILLUSTRATIONS.

CHURCH AT QUEBEC.—VALLEE & TANGUAY, ARCHITECTS.

VIEWS AT CREDIT FORKS MINING AND MANUFACTURING CO.'S QUARRY, CREDIT FORKS, ONT.

DESIGN FOR THREE HOUSES, SCOLLARD STREET, TORONTO.—DICK & WICKSON, ARCHITECTS.

A PROPOSED SIX-ROOM COTTAGE TO BE BUILT IN COLLINGWOOD, ONT.—FRED. T. HODGSON, ARCHITECT.

SYNOPSIS OF SPECIFICATION: Cellar to be six feet in the clear, and to be excavated under dining room and kitchen only. Quarried stone to be used in foundation walls.

Superstructure to be baloon frame, composed of 2 × 4 scantlings. To be boarded diagonally on the outside with hemlock or pine 1" boards, and horizontally on the inside with common inch lumber.

Building paper or felt to cover all outside boarding, including roof, before siding or shingles are put on.

Outside to be covered with No. 2 siding and picked shingles. To be shingled with No. 1 cedar shingles laid 5 inches to weather.

Sashes in dining room, parlor, kitchen and front chamber to be double-hung and furnished with sash-locks and lifts. Small panes in all sashes to have assorted colored glass.

All outside doors to be 1¾" thick, inside doors to be 1⅜" thick.

Cellar floor to be of concrete and cement, finished off smooth, and to have weeping tiles underneath for drainage.

Lower joists to be 2" × 10", second floor joists to be 2" × 8", and to be bridged every 8 feet of their length.

Ceiling posts to be 2" × 6", rafters, cellar beams and ties to be formed of 2" × 6" stuff. All inside studding in partitions, etc., to be 2" × 4" scantling.

Parlor to be finished throughout with good seasoned cherry, oak or black birch, including mantel and over-mantel. Bevel plate mirror in overmantel in parlor not less than 20" × 32".

All other wood finish to be of pine or elm.

Floor in kitchen to be of hardwood birch or maple; other floors to be: First story, pine; second story, pine or basswood.

Closets provided with shelves, drawers and wardrobe hooks. Fit up pantry with shelves, drawers, bins and china closet.

Fit up bath room—Victoria metal tub and necessary appliances for hot and cold water.

Provide water-closet with all necessary requirements.

Build chimney stack from cellar floor, containing three flues. Form in stack: two fire places, one in parlor and one in dining room. Provide grates for same with tile-facings and hearths. The one in dining room to cost not less than $18.00 complete, and the one in parlor to cost not less than $25.00 complete. Stacks to be built of hard-burned bricks. Chimney top to be of design as shown on drawings. Flues to be well and smoothly parged.

Lath and plaster in usual way, plastering to be three coat work. Run beads on margin of arches and on all projecting angles in inside walls. Run cornice 9" × 11" in parlor.

Paint all woodwork inside and out, not otherwise provided for, three coat work with white lead and linseed oil paint, and in such colors as may be determined upon. Hardwood finish in parlor to be filled, finished in "hard oil" and rubbed.

All glass to be of approved quality, to be "putty set" well fastened in sashes with zinc points and evenly glazed.

Hardware (specified) to be of good quality and approved.

Workmanship in all departments to be good and honest and of a durable quality.

The architect states that this cottage can be built and completed in good style for from $1,200 to $1,600, according to locality, amount of plumbing, style of finish and quality of materials employed in its construction.

It is convenient, not lacking in tastefulness, and well suited to the wants of a small family of limited means.

CONCRETE AS MADE ON THE TRENT CANAL.*

BY H. F. GREENWOOD, M. Can. Soc. C. E.

BEFORE beginning the paper proper, it might be well to mention when and how concrete has been utilized on the great canal works of Canada. These will be taken somewhat in the order in which they were built.

In the first enlargement of the Welland Canal, the foundations of the locks were generally made of concrete and timber. Concrete was used very extensively in foundations, when the Lachine Canal was enlarged, and also in the locks along the Ottawa River. The canals along the St. Lawrence River, between the head of the Galops Rapids and the foot of the Cornwall Canal, have concrete and timber foundations in all their locks, some of these bottoms containing as much as 2,000 cubic yards of concrete. Then the Sault Ste. Marie lock advanced concrete a step by showing its utility as a material for backing walls. It was also used in foundations and culverts at the same place. But the Soulanges Canal is really the pioneer as regards concrete for walls. Here the entrance piers, (about 1,100 feet in length) at the head of the canal are made of crib-work as high as the level of low water mark. After these cribs had properly settled, a wall of concrete eight or nine feet high was built upon them. Besides being very substantial, this has proven a success and looks quite as well as masonry. When the work on this canal was let, alternative bids were asked for masonry throughout and for concrete walls faced and coped with cut stone. Which of these kinds of work will be used the writer cannot say.

CONCRETE MIXER.

This brings us to the Trent Canal structures which were built wholly of concrete, no stone work being used at all. The concrete works constructed during the season of 1896 were on the Peterborough-Lakefield division, of which the writer has charge. This division consists of sections Nos. 1 and 2, with a firm of contractors for each section.

The work on section No. 1 consisted of one lock, and the concrete in connection with two dams which were in the course of construction across the Otonabee River, for the purpose of raising it to the proper level for navigation.

The concrete works on section No. 2 consisted of the following:—Pivot piers and abutments for two swing bridges, abutments for one high level bridge, these latter abutments being 33 feet above the bottom of the canal, concrete in connection with a pipe culvert which conducts a creek under the canal, and concrete walls in two water tight embankments.

The writer proposes to give, as briefly as possible, a description of the methods used and the precautions taken in constructing some of these works.

The specifications state that the contractors shall supply at their own cost, all plant, labor, moulds and materials necessary for the satisfactory execution and completion of the works, with the exception of the cement, which is supplied by the government.

SAND AND GRAVEL.—Extreme care was used in selecting the materials for concrete. The sand and gravel for section No. 1 were hauled in the winter, and were not at all difficult to find, as the conical and hog's-back hills in the vicinity are formed of these materials. Yet to find them free from clay, and to get coarse, sharp and well proportioned sand caused some delay. The contractors sub-let this to the surrounding farmers and local men with teams at so much per cubic yard delivered on the works. Samples were brought to the engineer's office by these people, and it was some weeks before the proper kind of sand was obtained. The well-intentioned sub-contractor thought that what he dug out should go into his sleigh box and none be wasted. So it was necessary to put an inspector at the pit to see that earthy matter, very fine sand and clayey gravel were all rejected, as it would be much more difficult to detect these after the material had been hauled to the works.

On section No. 2 the sand and gravel were obtained in a similar way; and, as the work progressed, delivered by dump-wagons at the side of the mixing platforms. These self-dumping wagons were of advantage to the contractors for this purpose, as they carried large loads and saved delay in emptying. Hauling the material as it was required saved moving it a second time; but unless the contractor had his own teams and wagons he could not be sure of a constant supply.

The following table is the result of sifting samples from two different grits:

	Residue on 400.	R. on 900.	R. on 2,500.	Passed 2,500.
1st samp.	19%	51%	22%	7%
2nd samp.	8	42	38	12

Both of these have given good results.

CEMENT.—The cement for the season was let by contract, to be delivered in cars at the railway siding nearest the work, where it was handed over to the contractor. One of our Canadian firms, the manufacturers of the Star brand, secured the contract, but they were not able to keep the works supplied and also satisfy the demand from outside customers. The consequence was that after a time they supplied us with the Condor and Josson brands of Belgian cement. All cements were subjected to the following tests:—Color: the cement to be of a uniform quality and of a light gray tint, after being made into thin cakes and exposed to the air, and in no case must it show yellowish blotches. Weight: the specific gravity to be not less than 3.1. Tensile strength, per square inch of section, to be as follows: neat cement after three days 250 lbs., seven days 400 lbs., twenty-eight days 550 lbs. Fineness: All cement to be ground of such a fineness that 90% of it passes through a sieve of 10,000 holes to the square inch. Soundness: This was determined by the Faijas apparatus. All pats when subjected to a moist heat of 110° Fahr. and warm water, to show no signs of blowing, for 24 hours after the tests were begun. All the above mentioned brands gave good satisfaction, but the Star brand was found to be more finely ground than the other cements. Unlike the other brands, it was supplied in "jute" sacks, which were found by the contractors to be more easily handled when using the mixing machine; but the writer considers that there is more waste, as a certain amount remains in the sack when emptying them. Six samples of cement were taken from each car as soon as

*Paper read before the Engineering Society of the School of Practical Science, Toronto, and reprinted from the copyrighted report by permission of the Society.

it arrived in Peterborough, and these had to pass the following tests, viz., sifting, specific gravity, and blowing, before the car could be sent to the contractor's siding, where it remained until the three-day test for tensile strength had been made. If this proved up to standard, the car-load could be transferred to the cement-shed erected by the contractor close to the railway siding.

Broken Stone.—The specifications called for this to be free from earthy matter and to pass through a two-inch ring. The crusher used on each section was well adapted for the work it had to do. On section No. 1 they used a "Blake" jaw crusher to break the selected stone from the excavated limestone strata. On section No. 2 a "Gates" crusher of coffee-mill type was used, and there the stone were principally hard-heads from the fields, or boulders from the excavation. The jaw crusher on section No. 1, run by steam, crushed about 150 cubic yards per day, while with the machine on section No. 2 electricity was used, and a cubic yard of broken stone was obtained in 3½ minutes.

Moulds.—The moulds for shaping the face of the lock walls were made by placing braced rectangular frames every five feet apart, and arranged so as to extend across that part of the lock for which they were intended. When they were in place, three-inch planed plank with half-inch lap joints were spiked to the vertical pieces and thus formed the face of the wall. Moulds of unplaned boards, made like very long doors and placed end to end on edge, formed the back of the wall. These moulds, the same height as the proposed steps, were braced from the face of the excavation.

Concrete Locks, Showing Moulds.

The moulds for the concrete, placed in front of the timber dams, were made in a similar way. In order to avoid sharp edges, mouldings with radii of from two to four inches were placed at all exposed angles less than 120 degrees.

For the bridges, the water-tight embankments, etc., the moulds were formed of scantling and plank placed in the same way as the moulds for the face walls of the lock, but were held in position by braces from the surface of the ground. Nearly all the face walls of bridges were built to a batter; whereas those of the locks were built plumb. In the high level bridge the moulds at the back were held in position by iron rods passing from front to rear of wall.

Methods of Making Concrete.—On section No. 1 the concrete for the locks was mixed by machinery and that for the face of the dams by hand.

The mixing machine consisted of a cubical sheet-iron box revolving on its diagonal axis about six feet above the ground. This box was held up by a framework which also supported a platform above the box, and let into this platform was a hopper for receiving the materials. In the rear of the mixer was a crusher with a carrier leading from it into a large box hoisted on posts, to receive the broken stone. The stone was let out of this box, by a small sliding door, into a car that held one cubic yard of stone. The stone was then taken by car and dumped into a large oak box, holding 1¼ yards, placed near the mixer. The cement which had been deposited on a platform close at hand was dumped in upon the stone. Then the sand and gravel, brought in from the sand pile by another car, was dumped in last and about filled the box. The box was then hoisted and the contents dumped in the hopper. A barrel on the platform of the hopper was kept filled with water by a force-pump at the river bank, and from this barrel a graduated tub was filled to the required height. When everything was ready the door of the cubical box was opened, and, when the slide door of the hopper was shot back, the tub of water was poured in as the materials were falling through in the mixer, which was then closed and revolved. It was found necessary to strike the mixer with mallets to keep the materials from sticking to the sides. After about sixteen or seventeen revolutions, the mixer was stopped and the concrete dropped into a box on a flat car beneath. It was then conveyed to the cableway, hoisted and run into the lock where, for the foundation, it was dumped, spread out in a layer of eight or ten inches and well rammed. For the walls the face was formed of mortar of proportion two to one, and two to five inches in width, as the case required, placed against the face mould, and this mortar was backed up by concrete in eight to ten inch layers, well rammed. Where bolts were built into the concrete, for the purpose of holding the wallings or iron casings, a three to six inch square turn was made on the end imbedded, which gave the bolts an L-shaped appearance; the other end of these bolts had a nut and washer on them. This arrangement was continued throughout, and a three-inch layer of mortar properly smoothed over formed the coping. By this process a cubic yard was manufactured every five minutes. The best ten hours' mixing was 140 cubic yards.

The concrete on section No. 2 was all mixed by hand, and here the proper proportions of cement, sand and gravel were thoroughly mixed together on the platform and spread out. Clean water was now added and the mass well worked with hose. Broken stone was then spread over this and the whole turned over twice. It was then put into barrows, wheeled and dumped into work, where the layers were well rammed, and the face of the wall treated as on section No. 1. The concrete along the face of the dams on section No. 1 was made and put in place in a way similar to that on section No. 2, except where it had to be placed in three or four feet of water, and then the following apparatus was used, viz.: a galvanized sheet-iron tube about one foot in diameter, and long enough to stand, when vertical, about two feet above the water. The upper end of the pipe was funnel-shaped. When the concrete was mixed it was shovelled into the tube, and, when this was full, it was raised about one foot and moved about. This allowed the concrete to slip down and more was added. Thus the concrete was put in without becoming saturated, as after the tube was once filled its contents did not come into contact with the water until it had left the bottom of the tube, when it was in the place intended in the wall. After a few days an examination showed that this concrete was quite satisfactory.

On section No. 1 a portion of the stone was much finer than the size called for, and consequently less gravel was required. After several trials it was found that the following proportions were most suitable, viz.: One part cement, two parts sand, two and one quarter gravel and seven of broken stone. On section No. 2 there was a less proportion of finely broken stone, and hence it will be seen that more gravel had to be used. The parts here taken were: cement, 1; sand, 2; gravel, 3½, and broken stone, 7.

Removal of Moulds.—The moulds for the smaller walls were not removed until after five or six days, and those of the higher, and, consequently, heavier walls, were kept on for several weeks.

After the removal of these moulds the walls present a very fair appearance, although there were occasional small projections where the plank had drawn apart and mortar had worked in; but these were easily removed with the edge of the trowel. The outlines of the plank were left visible, and gave one the impression of masonry courses. Where there were pine knots in the plank an impression of these knots was left on the wall, and these spots were found not to have hardened like the rest of the surface. However, a wash of water and cement, with which the faces of nearly all the walls were treated, remedied this.

Advantages.—About 11,000 cubic yards of concrete works were built during the season, and in the same classes of work the cost was not over two-thirds that of masonry. Its advantages are cheapness, expediency, the utilization of the ordinary laborer instead of the skilled mason and stone-cutter; and, besides these, the stone is more easily found. The use of this class of stone has a tendency to beautify the surrounding country, as the farmer is paid to remove those objectionable stone-piles one so often sees dotted over his farm.

CONTRACTS.*

By R. J. Edwards.

Not being a lawyer, I naturally feel a certain diffidence in attempting a paper on a subject involved in legal complexities and obscured in what, to the lay mind, appear to be many contradictory decisions. Perhaps the first solid ground one reaches is that it will not do to assume a thing is certain because it is stated in so many words in a text book on the law relating to building contracts. One must read on and turn back, consult all possible and impossible decisions relating to the matter and go over it again. At this stage one may take encouragement from a remark made by the late Sir John Thompson, and coming from a great lawyer it is of especial value in this connection. He said "no one was so likely to be mistaken as the man who was cock sure." Some one may ask, "why not give it up and insist on having all contracts prepared by lawyers." Well, I have seen it stated in the Building News that that was the practice in a certain city in Scotland, while in an adjacent city it was the rule with the architects to do it themselves, and it was said that in the former place there were floods of litigation in connection with building contracts, while in the latter place the stream was an exceedingly small one and was in danger of drying up entirely. Perhaps, long ere this, enough decisions have been recorded in the flood city to clear up all possible doubts and the inundations have become a thing of the past, and the wisdom of the lawyers has been demonstrated in our generation if not in their own. The best book on contracts I know of, is entitled "A Treatise on the Law of Building and Buildings," especially referring to Building contracts, &c. It is by Mr. A. P. Lloyd, of the Baltimore bar. The frequent references to English law and cases, together, of course, with American, make the work more valuable to us here than any purely English work, as decisions in our courts have been more or less influenced by the findings of United States courts. If there is a Canadian work of the kind I do not know of it. I may mention that I shall frequently quote from Mr. Lloyd's treatise. In his preface he says "while the plan of consulting a lawyer before entering into a contract is always advisable, it is a fact that attorneys sometimes omit, or wrongly state, important provisions. Many instances could be cited where legal lights have unintentionally transformed proper contracts into faulty ones, leading to legal complications, etc." This he ascribes in part to lack of proper attention on the part of text-writers to the subject of building contracts.

This, I think, will support the contention that the architect is really the person who ought to prepare the contracts, as he knows thoroughly what is intended to be accomplished. With us the object of a contract is to make it possible to insist that the plans and specifications are faithfully carried out in their entirety, with the least risk, or if possible, none at all, of litigation should it become necessary to enforce the correction of defective work or to employ other builders to complete the contract if neglected or abandoned by the original contractor. With this view our friends of the legal profession, I have no doubt will agree. To attain this object something more is necessary than the mere insertion of a number of clauses in the contract giving the architect unheard of and abitrary powers, and imposing penalties on the contractor. It has been well said that "nothing is settled until it is settled rightly," and if a contract is to stand if attacked in the courts it must be drawn up with reference to the accepted principles of law and in the light of experience gained by the study of decisions.

The plans and specifications shew and state in detail what is to be done, and no form of contract, however carefully drawn, can make up for defects or omissions therein. As the contract, therefore, is of little or no account without the specifications, there are the best of reasons for combining the two in one document. We all know that a slight difference in wording between the specifications on the one hand, written by the architect, and the contract on the other hand, prepared, I suppose, by the then City Solicitor, led to long and costly litigation as to the proper form of the notice dismissing the contractor for the new City Hall and Court House. If, however, the architect is to undertake the preparation of the contracts, it is not saying too much to assert that the client has as much right to demand knowledge and skill in the work as in the making of the plans and specifications.

Assuming that the plans and specifications are comprehensive and complete, what is necessary to be added to or incorporated in them to make the contract complete? The specifications will have already described the kinds and qualities of the materials. The contractor undertakes to carry these out, and it remains to provide against possible shortcomings or neglect on his part, and for payments on the part of the owner.

There are complications which experience has shewn are sure to crop up, such as settlements for extras and omissions and so forth. The ever-changing lien act is sometimes a cause of trouble; I do not feel competent to say anything about its provisions, but I may venture the assertion that if one keeps back plenty of money it will not cause inconvenience. There should be a clause in every contract providing that no extras shall be allowed or paid for unless the same have been authorized by an order in writing, signed by the owner, and stating the amount to be paid therefor. When this is done nothing but the written order will support the claim. Another clause should be inserted providing that where such an order is given, but the parties fail to agree upon the sum to be paid for the extra work contemplated, the work shall nevertheless be done forthwith, and the valuation of the same left to the architect. In practice this would rarely be found necessary. Where the extras are to be covered in each case by a written order the architect should be careful not to sanction any extra work not so provided for, because the contractor would perhaps fail to recover for such work even if assisted by the architect's certificate, for it has been held that where the contract provided that no extras should be incurred without a written order of the owner's engineer, the extra work done during progress, particulars of which were stated upon the certificates issued from time to time by the architect, was not authorized, and could not be recovered for, as these certificates were not counted as written orders.

A clause in a building contract providing for arbitration is considered, by Mr. Lloyd, to be objectionable, for the reason that the architect is the natural and proper arbitrator and in every way competent to decide. This supports the contention that every contract ought to contain an arbitration clause making the architect sole arbitrator in cases of disputes or doubt and binding both parties to the contract to accept his decisions without appeal. Such a clause will hold good, but it may be said it should be acted on promptly. His decision, in the absence of fraud, will be conclusive; but in a California case, where the contract stipulated that all disputes should be settled by the architect, the parties refusing to submit to his decision and he did not act in the matter, it was held that his testimony was not conclusive and that it was competent for the plaintiff to show by other persons the extent of the deficiencies. An arbitration clause will not confer on the architect any power to change the terms of the specifications without special authority, nor will his power as arbitrator permit him to give a certificate when there has been a substantial deviation from the owner's plans. An architect, however, occupying the position of an arbitrator is not liable to an action for refusing to reconsider his certificate or give the grounds of his opinion, no fraud or collusion being alleged, nor is any person called upon to act as arbitrator liable to an action for alleged want of care or skill or negligence. It will thus be seen that an architect who is arbitrator occupies a good position in regard to both client and contractor to check any desire on the part of either to get up a law suit owing to stubbornness or bad temper. If he is capable as an architect he will be quite capable as an arbitrator, and as he will be fully acquainted with every phase of the dispute, he will be far more likely to decide justly—especially as he can be coerced by neither party—than a court where at least half the testimony must be considered untrustworthy before a decision can be arrived at.

The architect's position is much strengthened as an arbitrator by the insertion of a clause making his certificate a condition precedent to the payment of money. In such a case the contractor cannot sue the owner without complying with this condition unless the same can be proved to have been fraudulently or or capriciously refused. The decision of a party passing upon work may of course always be impeached for fraud or mistake.

There should be clauses providing for the dismissal of the contractor for neglect or abandonment of the work and there might with advantage be a clause conferring power on the architect to correct minor defects, where there is neglect or refusal, and charge the cost to the contract, without having to go the length of dismissing the contractor. Such action might be limited to a sum to be agreed upon not to be exceeded in any single instance.

To enforce the completion of the work within a limited time it is usual to insert a clause naming a certain sum to be allowed or paid to the owner for each day's or week's delay in finishing the work beyond the date agreed upon. Sometimes this sum is

* Paper read before the Toronto Chapter of Architects.

called "liquidated damages," at other times it is a "penalty." There is a very fine distinction between these two terms. If it chances to be of the nature of a penalty, but the contract states distinctly it is "liquidated damages, agreed on by the parties, and is not in the nature of a penalty," it will make no difference in the interpretation the court will put upon the matter. Where the amount stated to be paid is evidently what the parties assess the damages caused by the breach of the contract, the stipulation will be upheld as liquidated damages, but where the object is to secure its performance by the imposition of an amount in excess of the loss likely to be sustained it will be considered a penalty and will not be enforced. It will not be difficult in most building contracts to fix beforehand the amount of liquidated damages and if an honest attempt has been made to ascertain the fair and proper amount even where there is more or less uncertainty it will be recoverable as liquidated damages.

In the case of a dwelling the probable amount of the rent that would be received may be taken or the owner may have sold the dwelling in which he was living at the time of making the contract and may have rented another. In any case the object ought to be to put the matter in such shape that there will be little likelihood of an attempt being made to drag it into court. It would seem that if the damages named are in the nature of a penalty, they cannot be enforced without applying to the courts. If they are really liquidated damages there is small chance of the amount being attacked.

At some future time I may attempt to draft a model contract, for discussion on the lines roughly laid down in this paper. For the present, though I have not exhausted the subject, I think I have covered the main points to be embodied in a working contract for everyday use.

THE CREDIT FORKS STONE QUARRIES.

Situated at Credit Forks, Ont., on the Orangeville branch of the C.P.R., about forty miles from Toronto, are the quarries from which the celebrated Credit Valley stone is obtained. This stone has a wide reputation owing to its adaptability for building purposes, and the interest taken therein by architects and builders justifies a brief description of the quarries and the method of developing them.

The quarries were first opened about seventeen years ago by Messrs. Scott & Pattullo and K. C. Chisholm, ex-M.P.P., of Brampton, who operated them in a moderate way for a number of years. In the year 1890 the property was purchased by Messrs. Carroll & Vick, of Toronto, they having the contract at that time for the Parliament buildings in Toronto, which were built of Credit Valley stone. This firm proceeded to operate the quarries on a more extensive scale, and as the stone became better known a much greater demand was the result. In the spring of 1896 the firm name was changed to the Credit Forks Mining & Manufacturing Company, Ltd., Messrs. Carroll and Vick still retaining the largest interest. The officers of the company are: R. Carroll, president; J. B. Vick, 1st vice-president; J. H. McKnight, 2nd vice-president; F. J. Beharriell, secretary-treasurer.

One of the first important buildings to be built of Credit Valley stone was the Hamilton post office, and since the erection of this building the demand for the stone has increased greatly, owing to its fine color and texture. In many of the best public and private buildings, churches, etc., this stone has been used, until to-day we find it being employed in all the principal cities of the Dominion, such as Montreal, Toronto, Hamilton, London, Peterboro', Woodstock, St. Thomas, Brantford and others. The Foresters' Temple and the new Union Station in Toronto, which speak for themselves as to beauty of appearance, are two recent buildings constructed of this stone. One of the essential features of the exterior of a building is that the materials should harmonize one with the other, and this quality is possessed to a large extent by the Credit Valley brown stone. It gives the appearance of weight and solidity to the building and does not require dressing to any great extent, a great deal of the beauty of the stone being in the natural rock, while the color is not deadened by the use of the tool.

The quarries are equipped with the best appliances, such as steam hoists, derricks, etc., to facilitate the quarrying of the stone in large quantities. The situation of the quarries is about 200 feet above the river bed, and upwards of 100 feet from the top of the mountain. On account of the great distance from the top, it is impossible to strip to work an open quarry. It therefore becomes necessary to mine by drifting in at the level of the freestone bed, and on a line with the brown stone, the five or six feet of grey and off color underneath making the floor of the mine. This leaves about eight feet of brown and two feet of grey on top. As will be seen by reference to the illustrations printed on another page, it is operated by means of two tunnels or gateways 150 feet apart and 12 feet wide, which permits of a tramway. These tunnels are now about 400 feet long, and at the end of each a drift 30 feet wide and from 75 to 100 feet long each way is mined. This is done by practical miners. First, they remove the shale between the freestone and limestone rock with picks, then break down the layers of limestone for say five feet up, this material being used for building supporting walls in old drifts. Sufficient room is thus provided to place in the timber to support the roof, which is done by placing large timbers across the drift about two feet apart, the temporary props used in the progress of the mining being removed in sections as the timbers are placed and wedged tightly to the roof. The work is then ready for the rock getters, who drill and blast out the rock in the usual way, taking great care in using the powder so as to cut the dimensions required without fracturing the rock. When the rock is cut it is placed on cars by means of wire cables running from the steam hoist through sheaf blocks hung from the timber of roof, the cars being propelled on tramways by steam power. The rock is then lifted off the cars by the derrick outside, and cut up into smaller dimensions by the quarrymen. When ready for shipment it is lowered to the siding by a tramway, the distance being 100 feet. Two trucks are used, which carry about six tons each. The loaded truck is lowered by a large drum with a brake at each end, and as it descends the empty truck is drawn up by a wire cable. About one hour is occupied in loading a car.

PERSONAL.

Mr. Benjamin Brick, contractor, of Toronto, is at present on a six weeks' trip to the Pacific coast.

Messrs. Jos. H. MacDuff and Ludger Lemieux, architects, have formed a partnership, with office in Montreal.

At Charlottetown, P.E.I., Mr. John W. Morrison, Secretary of Public Works for Prince Edward Island, died on April 12th, at the age of 77 years.

Mr. John Heyman, of John Heyman & Sons, contractors, London, Ont., has returned from a trip to England, and appears to be much benefitted in health by his visit.

The plumbing firm of Worthington, Garratt & Armstrong, Toronto, has been dissolved, Mr. Thos. Worthington retiring. The business will be continued by Mr. Armstrong under the old name.

Mr. W. H. Powell, architect, who has for a number of years practised at Stratford, has formed a partnership with Mr. James Carswell, of Chatham. The new firm will probably have offices in both the above cities.

Mr. J. H. McGregor, who has had charge of the Toronto agency of the Dominion Bridge Company, has resigned, and will engage in the mining business at Rat Portage. His successor is Mr. Geo. Evans, who will occupy the same offices in the Canada Life Building.

Messrs. Henry Simpson and J. A. Ellis, architects, of Toronto, have formed a partnership under the name of Simpson & Ellis. The arrangement will take effect on the first of June, and the new firm will occupy offices at 9½ Adelaide street. We predict for them a fair share of patronage.

Mr. J. Gill, one of the oldest citizens of Montreal, died in that city last month. Deceased was born in Edinburghshire, Scotland, on the 14th of February, 1806. He arrived in Montreal on the 21st June, 1833, and up to ten years ago carried on business as contractor and box manufacturer.

Mr. Alfred Bodley is the latest addition to the architects of London, having opened an office in the Hiscox building. Mr. Bodley, although a young man and a native of London, has already had a large experience both in Canada and the United States, and will no doubt succeed in establishing a good practice.

The fifteenth annual convention of the National Association of Master Plumbers is announced to take place in New York, opening June 15th and continuing for three days.

Mr. Charles Baillairgé, city engineer of Quebec, is fitting up a room for a museum of samples of building materials, models of paving and mechanical appliances used in corporation works. This will be found a convenience for contractors, engineers, etc.

New plumbing associations continue to be formed in the cities and towns of the Dominion. The latest effort in this direction is at St. Thomas, Ont., where Mr. J. Flaherty, assisted by other members of the trade, hopes to succeed in organizing an active association.

THE LATE MR. ALAN MACDOUGALL.

In the death of Mr. Alan Macdougall, the well-known civil engineer of Toronto, the city has lost an honored citizen and the engineering profession one of its most valued and popular members. It was generally known that for some time past Mr. Macdougall's health had been failing, and last year he visited Europe in the hope of gaining renewed strength. At one time he was thought to be on the road to recovery, but a few weeks ago the report was received in Toronto of his death, which occurred on the 23rd of April, at Exmouth, Devon, in the south of England.

Deceased was born in the year 1842, and was the third son of the late Col. Macdougall, of Edinburgh, Scotland, in which city he received an education of a high standard. In the year 1859, when seventeen years of age, he was articled to Mr. Charles Jopp, consulting engineer of the North British Railway Company, Edinburgh, finishing his term in 1863. Two years later found him resident engineer for the Monctonhall, Ormiston and Dalkeith branches of the above railway, which position he retained until coming to Canada in 1868. He was first employed in this country in making preliminary and location surveys and as chief assistant on construction of the Toronto, Grey and Bruce railway, under Mr. Wragge, then as resident engineer for the North Grey branch of the Northern Railway of Canada. For four years following 1873 he was employed on the staff of the Department of Public Works, Ottawa, having charge of construction of improvements on the upper lakes and lower St. Lawrence.

The Late Mr. Alan Macdougall.

In 1877 Mr. Macdougall returned to his native land, and was placed in charge of the head office of the North British Railway Company, as chief draughtsman, a position which he held for five years, after which he returned to Canada. For one season he was divisional engineer for the Canadian Pacific Railway Company on their South Western branch, and during the following four years practised as consulting engineer at Toronto, being for two years in partnership with Mr. Gray under the firm name of Macdougall & Gray.

Early in the year 1887 Mr. Macdougall received the appointment of assistant city engineer of Toronto, under Mr. Sproatt, in which capacity he rendered valuable service to the city, including some experiments to determine the direction and velocity of the currents in Lake Ontario. He also made the first surveys, in accordance with the report of Messrs. McAlpine & Tulley, in connection with the proposal to obtain water from the Ridges and Lake Simcoe. Owing to failing health, Mr. Macdougall obtained leave of absence from the city in 1888 to visit Great Britain. Shortly after his return his resignation was presented to the City Council, since which time he has been engaged in consulting practice in Toronto, devoting much of his time to sanitary science. Having given careful study to the subject of sanitary engineering, his services have been sought by municipalities in different parts of the Dominion. He was engaged by the city of Toronto to report on the sanitary condition of Ashbridge's Bay, and prepared plans for sewerage systems at St. Catharines, Stratford, Peterboro', Belleville, Vancouver, B. C., Brandon, Man., and other places. The valuable assistance rendered during an outbreak of diphtheria at St. Johns, Newfoundland, was such that he was solicited by the authorities of that city to accept the position of city engineer, which, however, he declined.

The late Mr. Macdougall was honored, in 1887, by being elected a member of the British Institute of Civil Engineers. He was also a Fellow of the Royal Society, Edinburgh, and the Royal Scottish Society of Arts, and in 1880 received the last named society's honorary silver medal for his paper on "Canadian Light Rays." He was prominently connected with the Canadian Society of Civil Engineers, and largely through his persistent efforts the organization of the Society was effected in 1887. For many years he served as a member of the Council, and in 1894 was chosen vice-president. From the time of the organization of the association until his death he labored faithfully to obtain such legislation as would make the society a close corporation, not with the object of personal advantage, but in the hope that by this means the professional status of engineering would be elevated. He was without doubt the most enthusiastic and earnest advocate of professional ethics in the society, and a perusal of the transactions of that body will show the time and attention which he devoted to the cause. An interesting paper on the subject, entitled "The Professional Status, a Plea for a Close Corporation," was read at the annual meeting in 1892, and created much discussion.

Mr. Macdougall took an active interest in the Canadian Institute in this city, was elected secretary in the year 1886, and held the position until his death. The portrait which appears on this page was taken from a painting by Mr. W. Sherwood in the possession of the Institute. As secretary of the committee Mr. Macdougall took the first steps to secure the approaching visit to the city of the British Association for the Advancement of Science. Deceased was elected a member of the St. Andrews Society in 1869 and appointed secretary in 1894. He was also a member of the Gaelic Society, and for two terms served as examiner at Toronto University.

Mr. Macdougall married a daughter of the late Dr. McFaul, of Toronto, and leaves a widow and four daughters. Personally, it may be said of him that all who knew him were his friends. A striking feature of his character was his consideration for others, and the kindly interest which he always evinced in the welfare of young men secured for him a host of friends. He was a great student, and might ever be found adding to his wealth of knowlege.

It is reported that the firm of J. & C. Hodgson will shortly resume operations at their pipe foundry at St. Henri, Que.

A valuable deposit of asbestos is said to have been discovered at Fish Creek, about twenty-five miles from Calgary, N. W. T.

It is reported that Haigh, Son & Co., the large Liverpool glass manufacturers, are about to establish extensive glass works at River du Loup, Que.

The plant of the Safe Lock, Metal, Shingle and Siding Company, of Smithville, Ont., has been purchased by a new company at Preston, Ont., formed under the name of the Metal Shingle and Siding Company. Cyrus Dolph, J. N. Clare, and H. D. Walker, all of Preston, are the first directors, and the capital of the company is $10,000. The new company started operations last month.

The following patents have been granted for Canada: Peter Fraser, Hamilton, device for heating and lighting; F. L. Decarie, Montreal, hose coupling; Philip Nicolle, Toronto, water closet; Adolphe Vervort, Montreal, fire-proof flooring and ceiling; P. C. Ogilive, Montreal, radiator section couplings; Carl Rubel, Louth, Ont., art of making lime; E. S. Manny, Montreal, hot water and steam boiler; I. and J. W. Crichton, Halifax, N. S., sash lock; Jas. D. Murphy, New York, fire-proof floor arch.

THE DUTY ON BUILDING MATERIALS.

By the new Canadian tariff, which took effect on April 23rd, several changes are made in the import duties on building and construction materials, but taken as a whole they are of a moderate character, and are not likely to seriously affect many industries. A feature of the new tariff is the double schedule, framed with the object of giving Great Britain a preference in our markets, and of compelling other countries to adopt reciprocal tariffs. This double schedule provides for reducing the import duty whenever any country gives certain concessions to the products of Canada.

Below are shown some of the changes affecting the building trade :

Portland or Roman cement, from 40 cents per barrel to 12½ cents per 100 lbs.

Fire brick, from free to 20 per cent. duty.

Copper wire, from 15 to 20 per cent.

Builders' hardware, from 32½ to 30 per cent.

Cotton, linen or rubber fire hose, from 32 to 35 per cent.

Sawn or dressed flagstones, from 30 to 25 per cent.

Floor earthenware tiles, from 35 to 30 per cent.

Glass, ornamented and colored, painted and vitrified, and rough plate glass, from 25 to 30 per cent.

Plate glass, not colored, in panes not over 12 feet, from 4 cents per sq. ft. to 30 per cent. ; over 12 feet and not over 30 feet, from 6 cents per sq. ft. to 30 per cent. ; over 30 and under 70 sq. ft., from 8 cents per sq. ft. to 30 per cent. ; over 70 sq. ft. from 9 cents per sq. ft. to 30 per cent. When beveled the duty on all sizes is placed at 35 per cent.

Iron hydrants, valves and watergates, from 27½ to 25 per cent.

India rubber hose, from 32½ to 35 per cent.

Rolled iron or steel angles, channels and special sections, weighing less than 35 lbs. per lineal yard, from 35 per cent., but not less than $10 per ton to $7 per ton.

Rolled iron and steel angles, channels and special castings weighing less than 35 lbs. per lineal yard, rolled iron or steel beams, joists, girders, column sections and other building or bridge structural sections not less than 25 lbs. per lineal yard, and rolled iron or steel bridge plate not less than ⅜ in. thick nor less than 15 inches wide, from 12½ to 15 per cent.

Bar iron, rolled or hammered, squares and bars and shapes of rolled iron or steel, not more than 4 inches in diameter, and flats not thinner than No. 16 gauge, n.e.s., from $10 to $7 per ton.

Iron and structural iron bridges, from 30 per cent., but not less than 1c. per lb., to 30 per cent.

Bridge plate, not less than ⅜ of an inch thick, nor less than 15 inches wide, from 12½ to 15 per cent.

Wrought iron pipe, from 30 per cent. and ½ cent per lb. to 35 per cent.

Cast or wrought iron, hollowware, from 27½ to 30 per cent.

Iron or steel plates or sheets, sheared or unsheared, and skelp iron or steel, sheared or rolled in grooves, and of all widths thicker than No. 17 gauge, n.e.s., from $10 to $7 per ton.

Iron or steel ingots, cogged ingots, billets and puddled bars, loops and other forms less finished than iron or steel bars, but more advanced than pig iron, except castings, from $5 to $4 per ton.

Cut nails and spikes of iron and steel, from ¾ cents per lb. to 30 per cent.

Pig iron, iron kentlege and scrap iron, from $4 to $2.50 per ton.

Cast iron pipes, from $10 per ton, but not less than 35 per cent. to $8 per ton.

Manufactures of steel and iron, or parts of iron and steel, from 27½ to 30 per cent.

Lead pipe, from 4/10c. lb. and 25 per cent. to 35 per cent.

Manufactures of marble, from 30 to 35 per cent.

Plaster of Paris, calcined or manufactured, from 40 cents per barrel of 300 lbs. to 12½ cents per 100 lbs.

Steam pumps, from 30 to 25 per cent.

Granite, flagstones and freestones, dressed, and all other building stone dressed, except marble, and n.e.s., from 30 to 25 per cent.

Lincrusta Walton wall decorations, from 1½c. per roll of 8 yards and 25 per cent. to 35 per cent.

Wire cloth of brass or copper, from 20 to 30 per cent.

Iron or steel wire, n.e.s., from 25 to 20 per cent.

Wire nails, from 1c. per lb. to 35 per cent.

In view of the above changes, we give some figures, compiled from the Trade and Navigation returns of the Dominion, showing the import of several lines of building materials from the different countries, together with value thereof :

Cement, hydraulic or water lime, from Great Britain, 2,810 barrels ; Belgium, 310 ; United States, 2,680 ; value $8,727. Portland or Roman, Great Britain, 93,307 barrels ; Belgium, 79,674 ; France, 11,112 ; Germany, 12,814 ; United States, 8,279 ; value $240,388.

Plate glass, Great Britain, 262,562 sq. ft. ; Belgium, 155,675 ; France, 87,855 ; Germany, 32,265 ; United States, 1,226 ; Austria, 7,798. Total value, $149,409.

Lime, Great Britain, 10 barrels ; United States, 10,229. Value $7,331.

Roofing slate, United States, 2,421 squares. Value $8,274.

Granite, flagstone, rough freestone and other building stone, rough, Great Britain, 854 tons ; United States, 13,904. Value $43,034. Dressed granite and freestone, Great Britain, 439 tons ; United States, 370. Value $11,442.

Cast iron pipe, from Great Britain and the United States, 43,778 cwt. Value $47,415.

Bar iron, 67,546 cwt. Value $121,096.

Fittings of wrought iron or steel pipe, Great Britain, 33,126 lbs. ; Germany, 5,839 ; United States, 1,304,376 lbs. Value $68,951.

Iron bridges and structural iron work, Great Britain, 77,785 lbs. ; United States, 1,121,188 lbs. Value $48,318.

Pig iron, Great Britain, 6,525 tons. United States, 31,680. Value, $406,916.

Cut nails and spikes, Great Britain, 44,442 lbs. ; United States, 710,726. Value $15,932. Other nails and spikes, wrought and pressed, Great Britain, 133,499 lbs. ; United States, 441,322. Value $20,262. Wire nails, Great Britain, 27,024 lbs. ; United States, 241,512. Value $9,008.

Steam pumps, Great Britain, 10 ; United States, 203. Value $39,237.

Rolled iron or steel angles, channels, beams, joists, girders and other bridge structural sections, Great Britain, 93,655 cwt. ; Belgium, 5,195 ; Germany, 80,239 ; United States, 58,863 ; France, 212. Value $270,261.

The arrangement of the duties on cement is rather in favor of Canadian manufacturers, but not to the extent that is generally believed. Under the former tariff the duty was 40 cents per barrel of 375 pounds. The standard barrel of Belgium cement is 350 pounds, therefore the duty under the present tariff of 12½ cents per 100 pounds would be 43¾ cents per barrel, or an increase of 3¾ cents. The standard English barrel is 375 pounds, which would make the present duty 47¾ cents less a discount of one-eighth under the preferential clause, leaving the duty to be paid on English cement this year at about 41½ cents. But after the first of January, 1898, a further reduction of one-eighth is to be given to Great Britain, in which case English cement may be imported under a duty of slightly over 36 cents per barrel, or four cents less than the former duty. It would appear from the above that the increased duty required to be paid on importations from other foreign countries may result in the use of greater quantities of cement of English and Canadian manufacture.

The present tariff does not entirely meet the views of Canadian bridge manufacturers. The duty on imported bridges is slightly reduced, while an increase of 2½ per cent. is made on bridge plate, which constitutes the chief imported raw material of the manufacturers. This increase, however, is not sufficient to seriously affect the Canadian firms.

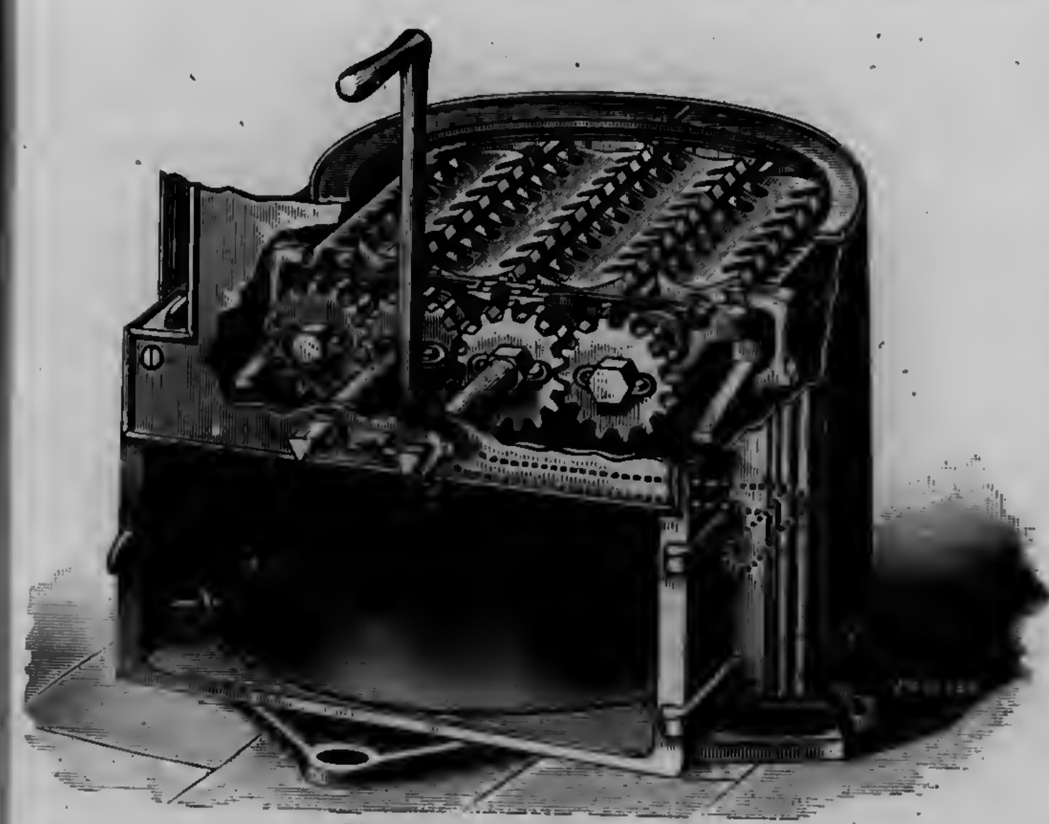
Manufacturers of heating apparatus view the new regulations favorably. The manufactured goods are now protected from foreign competition by a duty of 30 per cent., an increase of 2½ per cent., while pig iron, scrap iron, iron pipe, and such materials, which constitute the bulk of the raw material used in the construction of furnaces and radiators, are admitted more liberally than heretofore. Pig iron, formerly subject to a duty of $4 per ton, is now imported for $2.50, and wrought iron pipe at 35 per cent., whereas the old tariff on iron pipe was 30 per cent. and ½ cent per lb., which was equal to an additional 30 per cent., making the rate fully 60 per cent. As an offset to the above reduction, the government have increased the bounty to be paid to Canadian manufacturers of iron and steel. Notwithstanding the above reduction in cost of raw material, it is im-

probable that the price of heating apparatus, especially furnaces, will be lowered. The competition in this line has been so keen of late years as to produce very inadequate returns for the capital invested, and the public are now purchasing furnaces at the lowest possible cost of production consistent with efficient apparatus. One effect of the revised duty on pig iron will probably be to enable Great Britain to supply a greater quantity, as under the preferential clause she will be given an advantage over the United States. It is well known that, where in earlier years Great Britain supplied the bulk of the iron used in Canada, to-day the United States practically controls the market, as will be seen by reference to the figures of imports given above. The cost of production has evidently been greatly reduced in the latter country, while the cost of shipping is also in favor of the United States.

CANADIAN HEATING APPARATUS AND METHODS.

In connection with the article which appeared under the above caption in the April ARCHITECT AND BUILDER, the following particulars reached us too late to be embodied in the review :

Messrs. H. R. Ives & Co., of Montreal, have undertaken some changes looking in the direction of making the patterns and plant more perfect, so as to give the



McCLARY TRIANGULAR GRATE.

greatest uniformity in thickness of metal, and in perfect fitting of all the parts. Their "Buffalo" boiler has met with a favorable reception, as indicated by the fact that a shipment was recently made to South Africa.

Practical experience is continually suggesting improvements in the furnace manufacturers' plant, and each year some steps in this direction become necessary. As manufacturers of coal and wood furnaces the McClary Mfg. Co., of London, are among the leaders. They advise us that their "Famous Magnet" wood furnace was first introduced four years ago, and that their sales each year have been nearly doubled. For the coming season they are now making two new sizes, Nos. 12 and 112, of a cheaper and lighter line, and without ash pit. They also now make furnaces with four radiators taking 38½ and 50 inch wood. For their two larger sizes they have just completed a set of patterns for the burning of soft coal in addition to wood, to be used in territories where both fuels abound.

The "Famous Florida" coal furnace for this year, shown in the above cut, is so arranged that either flat or triangular grates can be fitted, as required, but in all cases they advise the use of flat grates.

The Clare Bros. Co., of Preston, Ont., are about to introduce a new hot water boiler and also a new steel radiator. The company have been experimenting for some time past with these new heating appliances, and have now brought them to what they regard as being a satisfactory standard of perfection. As already stated, this new radiator, which is about 16 inches in height, is constructed of steel, having cast directly to it an ornamental cast iron top and base. The manufacturers claim that this steel radiator will radiate much more quickly than if made of cast iron, and as a proof that they are working on right lines, point to the fact that the tendency in the manufacture of hot air furnaces, cooking ranges, etc., of late years, has been in the direction of steel.

MONTREAL.

[Correspondence of the CANADIAN ARCHITECT AND BUILDER.]

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE competition of the P. Q. A. A. for a "Letter Heading and Seal," open to architects and draughtsmen, has been decided by the committee of architects appointed for that purpose, as follows: The design marked with the motto of "Velos" was awarded first position, thus winning the premium prize of $20.00. The author of this suitable design, Mr. C. B. Patterson, has well handled the subject. Mr. Andrew Lindsay was awarded second place, and will receive $5.00.

It is to be hoped that if similar competitions should be inaugurated in the future, students will see it to be to their interest to respond more generously.

The course of lectures delivered during the last four months in the Art Gallery under the auspices of the P. Q. A. A. terminated on the 20th ult. with the lecture on "The Story of an Illustrious Abbey," by Mr. A. T. Taylor, F.R.I.B.A., president of the Association. The lecture, which is published elsewhere in this number, was illustrated by stereopticon views, and proved to be most interesting and instructive.

The Association are to be congratulated on the success which has attended this series of lectures. Should another series be arranged next year, they would be certain to attract a larger attendance and deeper interest.

At a special general meeting of the Association held on the 14th April last, in Montreal, the following resolutions were passed unanimously :

The Province of Quebec Association of Architects have learned with gratitute that His Excellency Lord Aberdeen, Governor General of Canada had consented to be nominated as patron of the Association.

Resolved : "That His Excellency Lord Ab rdeen, Governor General of Canada, be Patron of the Province of Quebec Association of Architects, and that the said Association offer to His Excellency their hearty thanks for the honor thus conferred."

On proposition of Mr. A. C. Hutchison, seconded by Mr. A. Raza it was also resolved : "That considering the generosity manifested of Mr. William C. McDonald by the creation, donation and equipment of a Chair of Architecture at the McGill University, the Association desires to express its approbation and gratitude for the benefaction bestowed upon the whole profession throughout the Dominion, and think that they cannot in a better manner convey their thankfulness than by electing him an honorary member of the Association."

PUBLICATIONS.

The Review of Reviews for May devotes its entire department of "Current History in Caricature" to the reproduction of cartoons illustrating various phases of the Turkish question.

The Canadian Manufacturer will shortly publish a special edition which will contain the new Canadian and American tariffs as well as the present British tariff and British Merchandise Act.

The proceedings of the Engineering Society of the School of Practical Science for the academic year 1896-97, a copy of which we acknowledge receipt of, contains many interesting and valuable papers on engineering subjects. Among those of interest to architects and builders are the following : "The High Building Problem," by W. B. Mundie ; "Concrete on Trent Valley Canal," by H. F. Greenwood, C. E. ; "Foundations for a Twenty-one Story Building," by T. K. Thomson, C. E., and "Crushing Strength of White Pine," by A. H. Harkness.

A useful book has just made its appearance from the press of Messrs. John Wiley & Sons, New York and London, entitled "Hydraulic Cement, its Properties, Testing and Use." The auther is Mr. Frederick P. Spalding, M. Am. Soc. C. E., Assistant Professor of Civil Engineering, Cornell University. This book contains the results of a careful study by the author of the nature and properties of hydraulic cement, methods of testing, and the limitations within which they may be accepted as reliable indications of value. A chapter is devoted to the use of cement in concrete, and mortar. The price of the book is $2.00.

One of the neatest productions of the printer's art which has reached our desk is catalogue "M" of the Metallic Roofing Company, of Canada, which contains numerous half-tone illustrations of artistic designs of ceiling and side-wall plates, wainscotting, borders and friezes, cornices, mouldings and other like manufactures. Some striking effects are shown in the full-page illustrations of ceilings composed of several designs, with mouldings, crosses, etc., to match. A partial list of buildings in which "Hayes" patent lathing, Eastlake shingles and embossed ceilings have been used is given, and show a wide distribution of these goods.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

GRANITE AS A BUILDING AND PAVING MATERIAL.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—There are indications in many of our large cities to-day that we are soon to see granite more in use for both building and paving purposes than it has been for some time past. A granite house—be it mansion or cottage—is the desire of most hearts; and were the means of acquisition as plentiful as the desire is common we should soon see in our towns and cities a large increase in the number of residences built of this handsome stone. No other class of buildings gives the same impression of solid, abiding, civic health and of faith in the future as the stone residences of all classes of the population. Indeed, the greater proportion of stone buildings in a city the greater is the assurance of that city's stability, for they are but the evidences of the faith of those most deeply interested in its welfare. But stone buildings are costly in the first place compared with buildings of a more transient nature, and this first cost often forbids their erection, to the great loss of the community both in civic and moral health. This forbidding item of first cost does not, however, operate to the same extent in the matter of paving our streets when granite is compared with other and less enduring materials. The difference in cost between granite blocks and asphalt is not to be considered beside the great difference in wear in favor of the granite. A little more than a decade ago asphalt was being spoken of so highly by parties interested in its sale and others interested in experimenting that it succeeded in gaining a hold in most of the large cities of Britain and Europe. But its hold was brief. In Berlin during the heat of summer it was no uncommon sight to see an officer stuck in its deceitful crust. In consequence of this undue adhesiveness, it was voted a nuisance, and Berlin went back to the use of granite blocks for many of her most important streets. In London and other great British cities the failure of asphalt has been equally apparent, and the granite block is now more in demand than at any previous time. In America, from New York to Denver, a similar experience has followed the use of asphalt, and it is giving way before the enduring stone. Now, in some cities another fad is being exploited. Brick is the cry; and the support of the cycling public is asked because it is said to make a dainty road for cycling. Still, cyclists have to consider the question of expense, and the dainty brick track and civic economy do not go hand in hand. Only the other day two Toronto aldermen found it necessary to refer to the bricks of Egypt and Babylonia to strengthen their case in support of their hobby, but it is not recorded that they brought to notice the preservative conditions which saved these bricks, and in this connection it might be mentioned that the same record of endurance follows the Egyptian granite under much more trying conditions; and even human bodies of the same date have come down to us in an excellent state of preservation. But such references are aside from the question. Experience in the cities of Europe has given granite paving blocks the highest award as an enduring and economical street pavement, and as already said, indications are not wanting that experience in American cities is following in the same direction, though perhaps with a tardier step.

EXPERIENCE.

GROWTH OF CRYSTALLINE BODIES.

QUEBEC, May 12, 1897.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—In the issue of the New York World of the 6th inst., under the heading:—"Wonderful Discovery of Prof. Von "Schroen, Scientist, Naples!—Baby Crystals Fatal Fights!—"A New Truth which will revolutionize Philosophy and influence "all Science!—Is all Matter Organic?—Dr. Von Hoist tells of "Photographs showing the Birth and the Growth of Stones."—I read that Dr. Von Hoist, of the Chicago University, has returned from Naples with the startling news that Von Schroen has discovered life in crystals.

I may not be sufficient of a scientist to enter into a consideration or discussion of this alleged vitality, this pretention that stones are of organic origin, neither do I believe anything of the kind. Still, the mode of formation of all crystalline substances may be considered a species of vitality; nor is the microscope indispensable in establishing this, for it can be abundantly witnessed by the naked eye in the formation of maple or loaf sugar from the syrup when sufficiently boiled, in that of rock candy around a string for the crystals to adhere to, in the formation of ice on the surface of water, where, under the influence of cold, needle-like crystals shoot out in all directions at the surface, until a film of ice, at first no thicker than paper, thus spreads over the surface and becomes gradually thicker by the addition to it of other crystals from below.

Nor can snow be called organic, though made up of crystals which arrange themselves symmetrically in hexagonal forms around a central nucleus, this being, apart from squares, the only area-filling figure, as with basalt in the Giants' Causeway and elsewhere, as also in the cell of honey bee and wasp, where the economic processes of nature are so intelligently thrust on man's attention; since the circular form would just as well have suited the size and shape of the insect's body, but would have left a useless space between the contiguous circles and have required 50 per cent. more wax or other material for the same number of cells.

Again, I say, the shooting out of crystals, the formation of the hexagonal column of "trap" from the fixed material thrown up by eruptive action, may be considered a species of vitality, as with protoplasmic cells while budding or rending off new cells from the parent nucleus or stem, and as imitated in the process by the cactus, which throws out its unaesthetic leaves, not only from the main stem or stalk, but the one leaf from the other, and as also exemplified in the animal world by polypi and other forms of animal life. Yet there is this essential difference between the two processes, that while the cells, the leaves, the poypi buds actually and gradually grow and increase in size by assimilating from the earth, the atmosphere, the water, the nutritive elements which go to make up their increase in size, which is actual vegetation, or an organic vegetable or animal process, the crystals, on the contrary, only grow by aggregative or by a mechanical addition to them under the influence of electric action and by the attraction of cohesion.

But while snow and stone crystals grow from central nuclei equally and symmetrically in planes all around, and even in spheres and polyhedra, it appears more difficult to explain the unsymmetrical process alluded to by Schroen, where the truly organic-like mode of vegetable growth or life is the more thoroughly exemplified, as in the formation of the exquisitely beautiful leaf-like, branch-like, tree-like tracery which everyone must have witnessed, and which may be detected in the process by the naked eye when, during frosty weather, the humidity or water from an overcharged or saturated inner or outer atmosphere, deposited or as condensed by window glass, is seen to crystallize and shoot out, not as in snow or basalt in equal and symmetrical radiation around a common centre, but in one or nearly one direction, and this, whether upward, downward or sideward, with the main stock or trunk originating from a sash bar or some portion of the surrounding framework as a starting point or base, and in absolute imitation of the growth of vegetable, fern-like forms, though different in this respect, that while vegetable life grows upwards or seeks the sun, the ice crystals grow or shoot out indifferently in all directions.

This is the tendency I would like to see explained, and where crystallizing seems actually to partake of organic life, as exemplified to Schroen's astounded vision by the use of his microscope, and the fights and struggles he alluded to between baby-crystals from different parental stocks, and the death or destruction of one of them by the other, illustrating, mayhap, Darwin's theory of "the survival of the fittest"—though in all this I cannot detect any absolutely vegetable, animal or organic life, but merely a most life-like process.

C. BAILLAIRGÉ.

Mr. T. Wooster, of Aylmer, states that he finds the ARCHITECT AND BUILDER very interesting and instructive reading.

Mr. James Lydiatt, formerly of the Wallaceburg Glass Company, will probably establish glass works at London, Ont.

About 1,200 plumbers went on strike in Chicago recently. The main point of difference was over the employment of helpers, the union insisting that not more than one helper be employed in each shop.

Messrs. Cadman & Williams, plumbers, of St. Thomas, report that prospects for a good season's business are very bright. As an up-to-date business firm, they believe that the plumbers' association now forming in St. Thomas will be beneficial to all.

Messrs. M. & N. K. Connolly, who are now at work on a large dredging contract at Philadelphia, have secured a vast contract from the government of Uruaguay for the construction of a canal sixteen miles in length. The contract price is said to be over $10,000,000. They will start work almost at once, and the probability is that some Canadian workmen will be employed by them.

THE STORY OF AN ILLUSTRIOUS ABBEY.*

By A. T. TAYLOR, F.R.I.B.A.

There is a community of thought and sentiment linking, as with a golden chain, the architectural expression of all ages and all races.

The same spirit worked amongst earth's earliest builders in brick and mortar on the plains of Shinar when they essayed to rear the tower of Babel; it seized on the boulders on the banks of the Nile, and the Sphinx speaks to us still of eternal silence and peace; it carved human headed winged bulls to stand on the marble pedestals of Ninevah, it raised the Parthenon on the hill of Athens—still exquisitely beautiful even in its ruins; it inspired the chisel of Phideas to give shape and embodiment to those splendid processional figures, fit necklace for the goddess Athena; it bade the Moors build their gorgeous Mosques and Alhambras, and in the gloomy north rose at its command abbey and cathedral, with their fretted cloisters, lofty groined roofs, flying buttresses, spire and pinnacle.

Conspicuous amongst these stands a venerable pile, the story of which, it will be my endeavor, however imperfectly, to bring before you this evening.

There is perhaps no spot of ground in the British Empire which ought to be so dear to every Englishman as that acre contained within the precincts of the Abbey church of St. Peter's, Westminster.

It would be difficult for the most prosaic, callous, or ignorant of mortals to visit this shrine, even if he knew nothing of its history, without a feeling of awe coming over him as he stept from the sunshine and busy life of the outer world to the religious gloom and silence of the interior; but to one who knew something of its history, traditions, associations and architecture, it would be impossible to do so without the keenest emotion and the intensest interest.

Architecturally it has no tall graceful spire like Salisbury, no magnificent central tower like Canterbury, it has not the richness nor loftiness of Beauvais, nor the storied wealth of sculpture of Wells or Amiens, it is not glowing with splendid color of marble and mosaic like the Lily Cathedral of Florence or the old Doge's church of St. Marks at Venice; but it is solemn, noble, venerable—in perfect keeping with the genius of the English people; it is woven into warp and wool of the texture of English history, and may almost be said to be part of the English Constitution.

Seventeen centuries clasp hands and encircle the Abbey. The mists of antiquity shroud its earliest history, but it is said that somewhere before the year 200 A. D., a small rude Christian church was built on Thorney Island on possibly the site of a temple to Apollo, just as tradition credits St. Pauls with being built on the site of a temple to Diana.

There is no doubt that there must have been a Roman station here, for a Roman sarcophagus was found on the site, and in digging more recently a Roman mosaic pavement was discovered in good condition, and also other remains. This is not to be wondered at, for there was a ford across the River Thames at this point, and the famous Walking-Street led directly to this ford until it was diverted eastward on the building of London bridge, and from the opposite side of the river the Dover Road was a great highway, so that it was not the secluded marshy impenetrable spot that some have described it to be, but full of life and pageantry.

In course of time, however, the flow of the tide of Roman supremacy had to ebb and the Saxons surged over the country again, bringing ruin and desolation everywhere. Thorny island shared the fate of many other places, and what had once been the scene of so much life, fell back into its original desolation.

The next glimpse we have of its history is when Sebert, King of the East Saxons, a convert to the Christian religion, after having built a church to St. Paul near by, on the site of the present St. Pauls cathedral, proceeded to restore the ruins of the old church or build a new one on Thorny Island, Westminster, to St. Peter. The legend of its supernatural consecration is repeated by all chroniclers—how at midnight on the eve of its consecration by Miletus, the Bishop of London, one Edric, a fisherman, was roused up to row over the river a venerable person who, on disembarking, entered the sacred edifice and suddenly it was lit up by a thousand tapers and the amazed fisherman heard heavenly words and music that ravished his soul; then all was still. On the reappearance of the mysterious visitant, he announced himself as St. Peter, and enjoined Edric to tell the Bishop on the morn what he had seen and heard, and as a token he was to have a miraculous catch of fish.

Any doubts the good Bishop had on the morn were set at rest by the lingering fragrance of unearthly incense, and the very palpable drippings on the altar of the wax candles of heaven!

The earliest document referring to the Abbey, dated 785 A. D., was a conveyance by Offa, King of Morcia, of some land to St. Peter and the "people of the Lord dwelling in Thorney."

And now the Danes overwhelmed the Saxons as the Saxons had overwhelmed the British, and desolation again reigned. After the lapse of a century King Edgar, urged by St. Dunstan, restored or rebuilt the church, and brought, we are told, twelve monks from Glastonbury. He also about this time began the Benedictine monastery, and gave a grant of the lands lying adjacent.

We now begin to emerge from the mists of antiquity and feel on surer ground when we come to the notable personality of Edward the Confessor whose palace was contiguous to the Abbey. A Saxon by birth, he was a Norman in heart and sympathies. He was a great builder, and coming fresh from the massive structures of Normandy he set his heart on rearing a noble monument to himself on this Isle of Thorns, and his name will ever be indissolubly connected with the Abbey. About 1050 he destroyed the old church and built a new one from the very foundation, which was completed and consecrated in the year 1065. We are told that its fame lingered in the minds of men for generations. It was the first cruciform church in England; its massive roof and walls and pillars were a marked contrast to the Saxon wooden rafters and beams, and was a herald and symbol of the mightier race who were soon entirely to dominate the enervated Saxon people.

It must have been a magnificent conception for the age in which it was built, and was a triumph of faith and devotion, combined with wonderful constructive ability. We gather from somewhat meagre accounts that its size was enormous, covering nearly the whole area of the present Abbey. A high tower rose in the centre, the stones were richly carved and the church was raised high and vaulted; the windows were filled with stained glass and the roof was covered with lead. The monastery, consisting of the refectory, dormitory and infirmary with its special chapel, and the cloister and chapel house were all begun by Edward the Confessor, if they were not finished by him.

The whole building must have been on a similar scale to the Abbaye aux Hommes at Caen. We have an interesting representation of the church in the well-known Bayeaux Tapestry, wrought by Queen Matilda, which allowing for even a Queen's ideas of architectural rendition, must have had some resemblance to the original, and is therefore most precious.

In it there is a quaint figure of a man on a slight bridge connecting the palace with the Abbey and holding by one hand the tower of the palace, and grasping with the other the weather-cock on the east end of the Abbey, indicating without doubt the close connection and contiguity of the two.

Dean Stanley in his memorials of the Abbey says: "This is the architectural expression of a truth dear to Englishmen; the close incorporation of the palace and Abbey from its earliest days is a likeness of the English constitution, a combination of things sacred and things common. The Abbey is secular because it is sacred, and sacred because it is secular. The vast political pageants of which it has been the theatre, the dust of the most wordly laid side by side with the dust of the most saintly, the wrangles of divines or statesmen which have disturbed its sacred peace, the clash of arms which has pursued fugitive warriors and princes into the shades of its sanctuary, even the traces of Westminster boys, who have played in its cloisters and inscribed their names on its walls, belong to the story of the Abbey no less than its venerable beauty, its solemn services and its lofty aspirations. Go elsewhere for your smooth polished buildings, your purely ecclesiastical places of worship—go to the creations of yesterday, the modern basilica, the restored church the non-conformist tabernacle, but it is this union of secular with ecclesiastical grandeur in Westminster Abbey that constitutes its special delight. It is this union which has made the Abbey the seat of the imperial throne, the sepulchre of kings and kinglike men, the home of the English nation, where for the moment all Englishmen may forget their differences, finding underneath its roof echoes of some memories dear to each."

Of Edward the Confessor's church very little remains, possibly one venerable arch in the south transept, certainly the huge pillars and portion of the wall underneath the dormitory, the low passage leading from the cloister to Little Dean's yard, and a small portion of the refectory, and of the infirmary chapel—these fragments have come down the centuries to us eloquent of the simple faith and devotion of this Saxon-Norman king. We may also add the rough bases of two of the piers of this choir which are now buried under the beautiful pavement on the north side of the choir.

There is something fitting in the thought that the temple he built to the glory of God became also his mausoleum; he was buried in front of the high altar, where his body rested until Henry III, desiring to do honour to his memory erected the magnificent tomb in the chapel of the kings, and removed his remains to that spot. Thus as it were, in the very heart of Westminster Abbey lies the dust of Edward the Confessor.

"The King is dead, long live the King." As the curtain falls on one great royal builder, it rises on another royal builder even greater than Edward the Confessor, viz., Henry III.

Henry's reign was an epoch not only for the Abbey but for England. The beginning of the 13th century was notable theologically for the immense stimulus, given chiefly by the preaching of St. Bernard, to the worship of the Virgin Mary. In architecture it was shown by the erection of a Lady Chapel at the east end behind the high altar of very many of the great cathedrals.

The first of Henry III's efforts in building was the addition to the Confessor's church of a Lady Chapel, which was dedicated by the young king at his coronation.

Like King James he was a "sore saint for the Crown," and he was a passionate devotee of religious observances. It is told of him that on his tour through France with Louis the King, he stopped so long to hear mass at every church he came to, that Louis caused all the rest of the churches on the route to be shut up until they had passed.

Fortunately with this he combined a passion for architecture; he was familiar with the glories of the cathedrals of Amiens, Rheims, Beauvais and Notre Dame, Paris, and his marriage with Eleanor of Provence introduced into England in her train many foreign artists and literateurs.

He was not content with erecting a Lady Chapel—his great dream of building an entirely new Abbey far more splendid than the simple one of Edward the Confessor began to take shape. We are told it was to be incomparable for beauty, even in that great age of art. This introduction of foreign ideas can readily be seen in the plan of the east end of the Abbey with its French

*Paper presented before the Province of Quebec Association of Architects, in the Art Gallery, Montreal, April 20, 1897.

chevet or apsidal arrangement and polygonal chapels. The English cathedrals have nearly always square east ends, the French cathedrals almost always the chevet or apsidal east end. On the gorgeous shrine of the Confessor, however, was lavished all the skill of Peter the Roman citizen. The mosaic pavement was brought from Rome. The enamelled and mosaic encrusted twisted columns surrounding it are suggestions from the Romanesque churches of Italy and the details are largely classical. We read that the Jews wept when they saw the second temple at Jerusalem so inferior, as they thought, to the glories of the first one. The 13th century English citizens must have rejoiced when they saw this new Abbey so infinitely grander than the previous one, and the old was forgotten in the glories of the new. The Societies for the Preservation of Ancient Buildings in England had they existed at that time, would have been horrified at the vandalism of Henry III, but they seem to have had no qualms of conscience in such matters in these good old days. They believed in the "know thyself" of Carlyle, and cooscious of their power they had no hesitation in pulling down the work of their predecessors and building more nobly and grandly. To us there has been distinct loss and there has been gain: loss, in that many splendid buildings have disappeared forever; gain, in that oftentimes finer ones remain to us in their place.

It is when we come down to comparatively modern times that we "tremble for the ark" and stay impious hands from meddling with those notable cathedrals and abbeys that have come down to us as a precious heritage from the past, for alas we know we have nothing worthy enough wherewith to replace them.

The centre of the new Abbey was the magnificent shrine of the Confessor, and if the good king knew, perhaps this was some compensation to him for the destruction of his church that he had built as well as he knew how in the dawn of the art in England.

Henry III lived to complete the choir and the east end of the Abbey with the ambulatory and chapels, the Chapter house, and at least the east-most bay of the nave; all which still exist, the date of this work being from about the year 1245 to 1260. The next four bays of the nave are credited to Edward the I., date about 1269 to 1300, and the remaining six bays were added in the following reigns of Edward the II and Edward the III. About the end of the 14th century and early part of the 15th century Abbot Litlington built the lower portion of the western towers forming the west-most bay, but unfortunately left the west front incomplete, also built the refectory on the ancient walls of the Confessor's work, as well as the Abbot's house, the Jerusalem chamber, the west and most of the south cloister. In 1498 Abbot Estney, we are told, put in the great west window. In 1502 King Henry the VII began his magnificent chapel on the site of the Lady Chapel built by Henry the III. The present western towers and gable were added by Sir Christopher Wren about the years 1730 to 1740, some say by his pupil Hawksmoor, but the weight of evidence is in favor of the great master. With the exception of the restoration of the chapter house by Sir Gilbert Scott, and a small portion of the facade of the north transept by the same architect, completed entirely within the last few years by Mr. Pearson, nothing since has been done to the main structure of the Abbey to alter it materially, and thus we are brought down to the present time. Such are the bare bones of chronology; it will be my aim now in the remaining part of this lecture to clothe these with as vivid particulars and interest as I am able, and I trust gradually to unfold the beauty of this grand old Abbey.

No description of the Abbey would be complete without a reference to the great Benedictine monastery of which this church was a part, and before describing the Abbey in detail, a glimpse of these buildings will not be out of place. It can only, however, be a mere glimpse, as a satisfactory account would require at least a whole lecture and as this subject has been so well treated recently elsewhere by Prof. Capper, it is the less necessary.

The general arrangement of Benedictine monasteries was always the same. We have a most interesting plan and description of St. Gall's in Switzerland built about the year 820; and also a bird's eye view of the one at Canterbury taken in the 12th century, preserved in the great Psalter in the Library of Trinity College, Cambridge, and on which Prof. Willis has written such an excellent monograph; so that we are in no doubt as to the arrangement, and are therefore able to trace out the remains at Westminster.

The buildings at Westminster are, as they were in nearly all cases, on the south side of the church, and surround the cloisters, although singularly enough in the two examples referred to above, they are on the north side of the church. On the eastern side of the cloisters was the dormitory, built on the old walls of Edward the Confessor, which communicated with the south transept so that the monks could get comfortably to early prayers. Below this was the common room of the monks. From this east walk entrance is obtained to the beautiful chapter house.

On the south side of the cloister was the refectory, kitchens, etc., and on the west side was the Abbot's house, in which is the famous Jerusalem chamber.

To the east of this group of buildings lay the infirmary, with smaller cloisters and an infirmary chapel and outbuildings. The north walk of the cloister next the Abbey was the Scriptorium, where the monks patiently elaborated their beautiful missels and manuscripts.

To students of architecture it is interesting to notice the great irregularity of the cloisters, the north and east sides being divided each into six bays, and the elevations emphasize the differences still more. Also the east wall of the cloister being co-ordinate with that of the Confessor's work takes the place of a west aisle to the south transept, differing thus from the north transept which has aisles on both sides. At Salisbury and in most other examples we find the cloisters regular and a unit in design.

The cloisters are amongst the most charming bits of the old monasteries and cathedrals, and I must confess that to me they have often formed the most attractive spots where I have lingered longest, and returned again and again with ever fresh pleasure. Here, away from the noise of the outer world, guarded by the venerable buildings that look down on them, lie these simple grass plots of hallowed ground surrounded by the open traceried and moulded arcades, where the changing shadows flit in and out, and the sunshine lights up ever and anon the old inscriptions on the pavements, gradually being obliterated by the feet of successive generations of men. Here quiet lives have been spent and ended, and their memorials are preserved perchance only by the illustrated missels and manuscripts now in museums and libraries, and to which they dedicated their strength and talents. Despise them not! By their laborious and loving industry they kept the lamp of knowledge and devotion bright and shining in those ages before the era of printing, and handed down to us living thought of inestimable value.

When one thinks of the lovely double arcaded cloisters perched like an eagle's eyrie on the top of the sea-girt rock of Mount St. Michel in Normandy; on that famous Campo Canta cloister at Pisa glowing with the brightest work from the brush of Benozzo Gozzoli, Andrea Orcagna, and Spinello Aretino; on the beautiful cloisters of Santa Croce at Florence the work of the great Arnolfo; on the mosaic encrusted arcades at Monreale and Palermo; thoughts arise too deep for utterance. But amid all the splendors of these cloisters one turns with very loving thoughts to the gray, worn and simple, but touchingly pathetic cloisters of our own English Salisbury, Lincoln and Canterbury, and not least to those of Westminster.

It may be interesting to those who like definite figures to know that the Abbey, including Henry the Seventh's chapel is 530 feet long externally, and the width across the transepts is 203 feet; that the nave is 38 ft. 7 in, wide, and 101 ft. 8 in. high inside; andthat the height of the western towers is 225 feet; I may add that of the English cathedrals York covers the greatest area, Winchester is the longest and Westminster comes fourth in point of length and area.

We make the confession at once that the least interesting portion of the Abbey is its exterior. It has been ruined by so-called "restorers" who would have been better named "destroyers." It is far less effective than many a smaller church. As we have already pointed out it has no central tower and therefore no main feature to dominate the whole structure as at Lincoln, Canterbury, Salisbury or Norwich. This is much to be regretted, as the balance of composition of a high central tower or spire, and subordinate western towers or spires is always felt to be eminently satisfactory. Sir Christopher Wren adopted the same idea in St. Pauls with its magnificent central dome and the two beautiful western campanili towers.

The Continental builders gave more prominence to their western towers and made their central feature of lighter design—more of the character of the fleche, and less important, and I cannot but think that many of their compositions suffer thereby. If it were possible to rear a lofty massive tower and spire at the crossing of the nave and transepts of Amiens or Rheims, or Notre Dame at Paris, in harmony with their magnificent western fronts, instead of the fleches now existing, we would have splendid buildings that would be almost unrivalled amongst all other mediaeval creations.

As we found a strong French influence at work shaping the plan of Westminster, possibly nothing more was contemplated at the crossing than a fleche, after the Continental manner, more especially as the four piers of the crossing do not appear strong enough to carry a heavy tower.

We learn from a report made by Wren on the condition of the Abbey that he contemplated a central tower at the time he erected the two western towers. He says: "The original intention was plainly to have had a spire, the beginnings of which appear on the corners of the cross but left off before it rose so high as the ridge of the roof. In my opinion the tower should give a proper grace to the whole fabric, and the west end of the city which seems to want it. I have made a design which will not be very expensive and light, but still in the Gothic form and of a style with the rest of the structure. To deviate from the old would be to run into a disagreeable mixture which no person of a good taste could relish. I have varied a little from the usual form in giving 12 sides to the spire instead of 8 for reasons to be discerned in the model. The angles of pyramids in the Gothic architecture were usually enriched with what the flower botanists call "Calceolus" which is a proper form to help workmen to ascend on the outside to amend any defects without raising large scaffolds. I have done the same as being of so good use as well as agreeable ornament."

However much one might have desired to see what Wren would have made of it, yet considering his imperfect knowledge of Gothic, and the semi-classic detail of his so-called Gothic western towers, I am unfeignedly thankful that his wishes were not carried out and that nothing was done.

Undoubtedly a central tower of good design would add enormously to the appearance of the Abbey, and I feel sure that if Mr. Pearson, its present architect, was intrusted with the work, the result would be worthy of the best traditions of mediaeval times.

Wren was permitted, however, to build the two western towers and complete the west gable. In the same report, referring to these towers, he says: "I have prepared perfect draughts and models, such as I conceive may agree with the original scheme of the old architect without any modern mixtures to show my own inventions."

In spite of this declaration there was very much of "modern mixtures" which are to be deplored. The lines of the towers are

good, and also their mass and proportion, but the details are poor and mixed and strike a jarring note in the harmonies of the exterior of the Abbey.

We turn, however, with unmixed pleasure to the splendid restoration of the north transept, the finest work that has been done on the exterior of the Abbey for the last 300 years. Begun by Sir Gilbert Scott and carried on and completed by Mr. Pearson, it stands almost unrivalled as a perfect piece of restoration, showing an insight into the spirit of the best Gothic work, and a knowledge of detail with a mastery of workmanship not surpassed by any old work that has come down to us. In the hands of ignorant men who are credited as having been pupils of Sir Christopher Wren, this great north transept had been utterly spoiled and vulgarized and it is a matter for rejoicing to see it now. I hope to be able to show you presently on the screen the two fronts so that you can compare them. Mr. Pearson has also done some good restoration work to the south transept and part of the south aisle and cloisters.

At the east end of the Abbey, challenging notice from its utter dissimilarity to the rest of the fabric, is the famous Henry the Seventh's chapel. Like the Abbey, however, its glory is in its interior and not in its exterior. Outwardly it is a tour de force in architecture—a stone framework for immense mullioned bay windows, and covered with restless panelling and pinnacles that tease the eye and worry the mind, and give no rest to body or soul.

There is no good point of view from which a complete and comprehensive view of the Abbey can be obtained; on the south side it is hemmed in with houses; at the east end it was similarly shut in, but recently some old houses have been pulled down, so that the chapter house and Henry Seventh's chapel can now be seen.

On the north side it is more open, and the tide of busy human life and traffic flows past it day and night, surging up almost to the portals. Here stands the parish church of St. Margaret's close under its shadow. Some have urged its removal, but its presence is so time-honored and it gives such scale and perspective to the Abbey that it were better left.

But we must not linger longer outside. Let us cross the threshold and enter it.

It is pleasant to lay aside the cloak of criticism and don the robes of praise and admiration. If the exterior lends itself to disparaging comparisons, the interior disarms and overwhelms us by its unique beauty, tender grace and lofty magnificence. The nave and choir soar up as if into illimitable space, and are unusually high for their width, reminding one again of French influences, although in detail they are thoroughly English. The suberb arching and piers lead us up to the magnificent triforium, with its beautiful fenestration, which has been said to be unequalled elsewhere, and then still upwards to the great clerestory windows, and above that to the groined stone arched roof.

We cannot be too thankful that the builders of the western portion of the nave had the great good sense and magnanimity to sink their individuality and complete the nave on the lines and with close similarity to the four eastern bays of the nave built a century before. The whole nave has thus a unity and harmony which it would not have had if they had built it in a later style, as was usual and commonly done in so many other places.

The only difference is in the details of mouldings, in the shafting of the nave piers, and in the absence of the beautiful surface diaper work of the earlier time, differences which do not affect the general appearance, and are most interesting as serving to maintain a distinct yet harmonious personality.

The transepts are as fine as the nave, and have special features distinguishing them, such as the great rose window and the carved angels in the spandrels of the triforium, reminding one of the beautiful angel choir at Lincoln. The triforium space is unusually ample and large in the Abbey, and forms in reality a continuous gallery round the church, from which large concourses of people could view ceremonials below.

The ritual choir is brought down four bays of the nave, and is divided off by a modern screen erected by Blore. On the top of this screen the organ used to stand, but was removed, divided up, and placed at the sides some years ago.

At the east end of the ritual choir is the grand screen, a noble piece of work, the eastern side of which dates from the 15th century and has carvings illustrating incidents in the life of the Confessor. In front of this, and also behind it, is a very precious and unique piece of mosaic pavement called Opus Alexandrinum, formed of rare marbles. There is but one other piece of pavement of this kind in England, namely, at Canterbury.

A series of chapels cluster around the east end, culminating in the Chapel of the Kings, lying immediately behind the high altar. Here is the famous Coronation Chair and stone on which all the Kings and Queens of England have been crowned since the time of Edward the First. This "Hammer of the Scots" brought the famous stone from Scone, the old Scottish capital. The chair enclosing this stone was originally intended to be of bronze, and we are told the workmen had actually begun it, but for some reason or other it was made of English oak and decorated by one Walter, a famous painter at that time.

A nimbus of legendary fame encircles this stone. The legend runs that it is the stone which Jacob took for his pillow at Bethel, and was transported by his descendants to Egypt. The son of the King of Athens who had married the daughter of Pharoah, alarmed at the fate of Moses, fled to Sicily or Spain with it. From thence it was carried to Ireland, and on the sacred hill of Tara became the stone of Destiny, and on it the Kings of Ireland were crowned. Fergus bore it from Ireland to Dunstaffnage, and as the Scots went eastward Kenneth II. in 840 removed it and set it on a raised mound in Scone. There, incased in a chair of wood, the Kings of Scotland were crowned. Such is the legend—I cannot vouch for its truth.

The other Coronation Chair which stands beside it is much more modern, and was made for the Queen at the time of the accession of William and Mary.

Addison, in one of the numbers of his "Spectator," gives an amusing account of a visit of Sir Roger de Coverly to the Abbey. He says, "When they came to the chair, having heard that the stone underneath the more ancient of them which was brought from Scotland was called Jacob's pillow, sat himself down on the chair and, looking like the figure of an old gothic king, asked the interpreter what authority they had to say that Jacob had ever been in Scotland. The fellow, instead of returning him an answer, told him that he hoped his Honor would pay the forfeit. I could observe Sir Roger a little ruffled on being thus trepanned, but our guide not insisting on his demand, the knight soon recovered his good humor, and whispered in my ear that if Will Wimble were with us and saw these two chairs it would go hard but he would get a tobacco stopper out of one or t'other of them."

This cutting and scribbling mania seems to be a disease not confined to the present day, and the Coronation Chair is almost covered with names cut and scribbled on the back and arms, many of them of some antiquity.

One cannot take the most cursory view of the Abbey without being impressed by the monuments that obtrude themselves at every point, but as I desire to give you some idea of the architecture of the Abbey first, permit me to complete our round before taking up the monuments.

Between the chapels of St. Nicholas and St. Paul you enter by a flight of steps under a frowning arch and through beautiful brazen gates into the famous Henry the Seventh's Chapel. It has been called a "miracle in stone," and in spite of its debased Gothic it fascinates you by its bold daring, its reckless exuberance of ornament and detail, its triumph over what are generally considered the limitations of stone.

This chapel is almost itself a miniature cathedral, for it has a nave, two aisles and five apsidal chapels, and is considered the finest perpendicular or ecclesiastical Tudor building in England. Its chief wonder and glory is its fan traceried roof. Washington Irving speaking of it says: "Stone seems by the cunning labors of the chisel to have been robbed of its weight and density, suspended aloft as by magic, and the fretted roof achieved with the wonderful minuteness and airy security of a cobweb." We have somewhat similar roofs in King's College Chapel, Cambridge, St. George's, Windsor, and a few places elsewhere. It is difficult to describe this roof, but I hope to show you on the screen the construction of it. In the meantime I may just say that the main groining ribs spring from the caps of the columns and form flat, slightly pointed arches; studded all over are stalactite pendants, through which the ribs seem to go, and these spread like the branches of a tree until they meet each other in bewildering panelled and cusped reticulations. They appear most puzzling, but they follow certain well-defined lines of construction which when mastered give the key to the puzzle. To strengthen the haunches of the springing arches the space is filled in with cusped panelling. We have to thank Sir Christopher Wren for the preservation of this roof, as in his time it was threatening disintegration, but owing to the steps he took and his wise care, this disaster was averted, and it still remains, a wonder to each succeeding generation.

The abbey, unfortunately, is not rich in old or even good modern stained glass. In the Triforium of the Presbytery there is still a little grisaille of the 14th century. In the east window of Henry 7th's chapel is a figure of the founder. Here and there we find fragments of old glass have been worked in. The great Choir of Amiens seems but a framework for its glorious glass, but Westminster derives no glamour from "storied windows richly dight."

One of the most exquisitely beautiful parts of the abbey is the Chapter House; it was the council chamber of the monastery and is almost peculiar to English cathedrals. It is a detached octagonal building, about 52 ft. in diameter, somewhat similar to those at York, Lincoln and Salisbury, with a slender central clustered pillar of Purbeck marble about 35 feet high, from which the ribs of the vaulted roof spring, branching out like a tree to a height of about 50 feet from the floor, and drooping to the angles of the walls.

The double doorway entering from the cloisters is singularly beautiful. All round the walls under the large windows is a stone seat and arcading, behind which are some old and remarkable paintings of subjects from the Apocalypse found at the time of the restoration by Sir Gilbert Scott, and supposed to have been painted by Brother John in the reign of Edward 4th.

The Chapter House has passed through very trying vicissitudes; it was erected in 1250. The House of Commons came into existence in 1265; they first sat with the Lords in the great hall of the palace adjoining, but in 1282 they parted, and the Commons used this Chapter House until the death of Henry VIII in 1547. Then it became national property and was used for storing the public records, and to obtain more room the groined roof was taken down and galleries erected. It thus remained in this state of humiliation until 1865, when it was restored to its original beauty as it now is.

The Jerusalem Chamber is part of the Dean's house and originally of the Abbott's house, and obtained its name probably from tapestries or pictures depicting the history of Jerusalem, on the walls. This chamber is a Mecca for all good Presbyterians, for here the Directory, the Larger and the Shorter Catechism and the Confession of Faith were drawn up while the famous Westminster Assembly sat from 1643 to 1649, and here also more recently the revisers of the Bible carried on and completed their work.

Retracing our footsteps, and passing on the way the Chapel of the Pyx, or the treasury where the Royal regalia was kept for years, we again enter the abbey to glance at the monuments.

The abbey in its illustrious dead is very cosmopolitan. Here churchmen and noncomformists lie side by side; the dust of the foreigner mingles with that of her own sons. Kings and queens, statesmen, philanthropists, poets, preachers, musicians, warriors, men of science, architects, all are there.

Victory or Westminster Abbey has not alone been Nelson's watchword; it has furnished the incentive for many an heroic struggle against the elements of evil.

In course of time there has grown up a rough classification in the position of the monuments. Thus we have Royalty in the Chapel of the Kings and in the chapel of Henry the 7th; statesmen in the North Transept; poets and literary men in the South Transept, called the "Poet's Corner." Even to these, however, there are exceptions. Our steps instinctively turn first to the heart of the abbey—the Chapel of the Kings, and to the tomb of Edward the Confessor, for whom the abbey was intended by Henry the III as a magnificent mausoleum. It had to be placed to the east of the High Altar, and as the Lady Chapel was

already built here by Henry, to obtain room the High Altar was moved further west to the position it still holds. This magnificent shrine erected in 1260, the work, as we are told from the inscription, of Peter of Rome, was splendid with tabernacle work above, supported on beautiful arches springing from twisted columns and sparkling with glass incrusted mosaic, and even now, in its decadence, is still most beautiful.

Beside him lies good Queen Edith his wife, of whom we are told that being well skilled in needle-work, she embroidered the state robes of her husband. She was the daughter of Earl Goodwin, whose castle once stood on the spot where the fatal Goodwin sands now are.

Near by is the tomb of Henry III, who, after a reign of 56 years, a long reign for those troublous times (now eclipsed by the 60 years' reign of our gracious Queen) was drawing near his end. The Crusaders' Temple church was to have been his sepulchre, but his heart's affections had so entwined themselves round the abbey he had almost entirely rebuilt and loved so well, that no other place seemed so fitting.

In marked contrast is the plain tomb of Edward Longshanks. When the tomb was opened in 1774, nearly 470 years after his death, we are told the embalmed body was found in good preservation. Some one had the curiosity to measure the body, and found it to be 6 ft. 4 in. long.

There are a number of other tombs here, but of lesser importance, and near by are the "Crusaders'" beautiful Gothic tombs of the Decorative period, the one to Aymer de Vallance being specially well known, and whilst we are amongst the super-refined dust of kings and queens, we will maintain the royal succession by passing into Henry the Seventh's chapel. Having previously examined its architecture, we are able now to devote our attention to the Royal Founder's tomb, which is so huge as to defy neglect. Not only in size, but in richness and splendor, it compels notice. Pietro Torregiano, a companion and friend of Michelo Angelo and a Florentine, was brought over to execute it. The tomb is made of a kind of black marble, on which rest recumbent figures of the king and his queen, and is of great richness. Surrounding it is a high screen of brass or bronze perpendicular Gothic work of the most intricate and elaborate design and workmanship. It originally had 36 statues in canopied richness, of which only six remain. So heavy and ornate is this screen that the tomb is almost hidden from sight by it.

Most interesting amongst the other tombs are those of Queen Elizabeth in the north aisle, and Mary, Queen of Scots, in the south aisle. The latter was buried first at Peterboro; and from thence was removed here by James 1st in 1612. Implacable enemies in their lifetime, their dust mingles in neighborly unity.

In the chapel at the east end Cromwell was buried in 1658. With the barbarity of the age, a few years afterwards the great Protector's body was disinterred and hung at Tyburn, whilst his head was placed on Westminster Hall. It is pitiful to think of the petty spite that could prompt such treatment of the body of one whose shoe-latchet in his lifetime these men were not fit to tie.

Dean and Lady Stanley lie buried in one of the small chapels. It may be said of them, "they were lovely in their lives, and in their last resting-place "they were not divided."

Coming back to the abbey proper, in St. Paul's chapel is the monstrous statue of James Watt by Chantry, hideous as his own steam engine, and so heavy, we are told, that in bringing it in, it broke through the pavement into several of the vaults below, disturbing hallowed dust. In the Chapel of St. John "Baptist" is the large monument of Lord Burleigh, with recumbent figures of the Earl and his Countess Dorothy; on his other side is a vacant space which was intended for the effigy of his second countess, but she indignantly refused to divide honors with his first wife, and the space remains vacant to this day.

We must not pass the portion of this chapel called Abbot Islip's Chantry without ascending to the chamber above, to see the curious wax effigies collected here, suggesting to the irreverent reminiscences of Madame Tassands. It was the custom at all burials in the abbey to have a waxen effigy clothed in the garments usually worn by the deceased, carried in the procession and afterwards deposited in the abbey, a custom which had a precedent in ancient Rome.

From time to time some of these have been destroyed, and now but few remain. On my last visit to the abbey, quite a number were there, but all rather dusty, ragged, and unmistakably showing the ravages of time. Amongst them were Queen Elizabeth, Charles the II, Queen Anne, William and Mary, Lord Nelson and others, furnishing an instructive commentary on the vanity of rank and pride.

In the next chapel—that of St. John the Evangelist—is the famous monument to Sir Francis Vere, modelled on the lines of that of Countess Nassau at Breda, where four kneeling knights bear a slab with the arms of the dead hero who lies underneath. The story is well known of Roubilliac the sculptor, who was found standing in rapt admiration of one of the knights, and on being accosted, said, "Hush! he will speak presently."

In St Andrew's chapel is the (perhaps best known and intensely dramatic) Lady Nightingale monument, by the sculptor I have just mentioned, where her husband is vainly trying to arrest Death, who is in the guise of a partially draped skeleton issuing from a tomb, from throwing his dart at her. The monument is in the worst possible taste and most repulsive and horrible, and it is a great pity that this and many others ever found their way into the abbey.

As we have already intimated, the North Transept is the Statesmen's Corner, and here are monuments to Lord Chatham, Fox, Grattan, Palmerston, Pitt the Younger, the two Cannings, and Peel. In the west aisle of the transept are memorials to Blow Burney and Purcell, the musicians and composers, and also to Cobden of Free Trade fame, and the noble-souled high-strung Wilberforce, who gave his best years to the abolition of slavery.

The "Poet's Corner" in the South Transept is classic ground. The founder of this peaceful and quiet dynasty was Chaucer, "that well of pure English undefiled," where so many small authors have had their little pitchers filled whereby they have refreshed their day and generation. The next was Spencer of "Fairy Queen" fame, a book in many volumes which everyone has heard about, but I venture to think few have read. He was followed to the grave by Beaumont and Fletcher, Ben Jonson, and probably Shakespeare. The latter has the well-known monument here, but he is not buried in the abbey. The Avon rocks him to sleep at Stratford. There was a wish to lay him in the Poet's Corner, and Basse, a poet of that time, quaintly wrote, "Renowned Spencer lies a thought more nigh to learned Chaucer, and rare Beaumont lies a little nearer Spencer, to make room for Shakespeare in your threefold fourfold tomb."

The epitaph "O! Rare Ben Jonson" is familiar to all; his monument is here, but he is buried in the north aisle of the nave. The story is that he asked Charles I to grant him a modest request, viz., 18 inches square of ground. This was readily granted by the king. When he learned it was to be in the abbey, the royal giver hesitated, but a king's word is not to be lightly taken back, and so the story goes, that Ben Jonson was buried upright in his 18 inches of ground. When digging at this spot a skeleton in an upright position was actually found, giving a certain color to this story.

Next come Dryden and Butler, and the monuments of Milton and Gray, memorials only however, for Milton's dust reposes in the fine old church of St. Giles Cripplegate, amid the bustle of city life, and Gray lies in the quiet remote churchyard of Stoke Pogis which he has immortalized in his Elegy.

The monument of Gray attracts notice from its cynical couplet, put on it by his own desire: "Life is a jest and all things show it—I thought it once, but now I know it."

There is also a monument to Addison, but his grave is in Henry the Seventh's chapel.

Southey, Dr. Johnston, Goldsmith and Thompson are not forgotten.

Time would fail me even to enumerate the glory roll of those buried in this corner. To mention only a few amongst many: Of musicians we have Handel; of historians, Macauley and Grote; of novelists, Charles Dickens and Thackeray; of actors, Garrick; of architects, Chambers, Wyatt and Sir Robert Taylor. Curiously enough, no painter is buried in the abbey.

Coming now to the nave and aisles. There is one interesting spot in the middle of the nave, the spot where one of the truest and grandest of Scotland's sons is laid—I mean Livingstone. His heart was fittingly left in the great Dark Continent for which he gave his life.

Not far from him lie the engineers, Telford and Stephenson, and here also is the dust of Sir Gilbert Scott, who was architect to the abbey for many years, and his comrade, George Edmund Street, architect of the Law Courts; also Sir Charles Barry, who lies almost under the shadow of his greatest work, the Houses of Parliament.

Amongst naval and military heroes in the aisles are Lord Clyde, Outram and Dundonald. In front of the choir lies Sir Isaac Newton, and amongst the monuments we must not forget the one to John and Charles Wesley, who did so much to quicken the religious life of England; and in the Baptistry near the western door are two sweet singers —Wordsworth and Keble.

The incongruities in the memorials in the abbey must strike everyone. It is truly cosmopolitan in taste, as in creed and nationality. Many names are found of those who reflect little credit on the illustrious edifice, and many names we miss of those who would have added lustre to this National Campo Santa.

For lack of proper and wise oversight, monuments have been admitted which are felt by everyone to be singularly out of place, and out of touch with the genius and spirit of the architecture of the abbey. Some notorious ones I would have no hesitation in removing, but traditions and vested rights are no doubt obstacles.

The abbey and precincts are now so crowded that many more interments cannot take place, nor many more monuments be admitted.

The necessity of maintaining the continuity of the succession of the memorials and remains of the mighty dead, together with the best means of overcoming the lack of space without incongruity, or disturbing the best traditions of the abbey, has for some been exercising the minds of those in charge.

Many designs have been made, embodying such ideas as a second large cloister or Campo Santa, a large crypt or chapel adjoining, etc.; all these schemes have found their ardent advocates and vehement objectors. Something must be, and doubtless something will be, evolved, that will be felt by all to satisfactorily meet the difficulty.

I have referred to the absence of many names we might have expected to find here, and I cannot close better than by quoting a sentence by Dean Stanley in reference to this. He says: "Westminster Abbey is, as Dr. Johnston well said, the national resting-place of those great men who have no bond elsewhere; its metropolitan position has in this respect powerfully added to its fame. But even London is, or ought to be, insignificant compared with England; even Westminster Abbey must at times yield to the more venerable, more enduring claims of home and race. "These quiet graves far away are the Poets' Corner of a yet vaster temple, or may we take it another way and say that Stratford-on-Avon, and Dryburgh, Stokepogis and Grasmere, are chapels of ease united by invisible cloisters with Westminster Abbey itself."

The largest church edifice in the world is St. Peter's in Rome; the smallest is a church ten feet square in the Isle of Man.

His Excellency Lord Aberdeen has accepted the office of patron of the Province of Quebec Association of Architects, as a mark of his appreciation and good wishes for the association and the profession in general. At a recent meeting of the Association Mr. William C. McDonald was elected an honorary member in recognition of his great generosity in endowing a chair of architecture in McGill University.

Judge Ouimet has given judgment in the long-contested case of A. R. McDonald, ex-superintendent of the Intercolonial Railway, against Charles Riordan of St. Catharines, the estate of the late John Macdonald and Ed. Boswell. The plaintiff claimed a large sum as due him in connection with the Temiscouata Railway, and the court gave judgment for $197,000 with interest for seven years at 6 per cent. It is probable the defendants will carry the case to a higher court.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Some Guides for Estimators.

THE great difficulty in preparing rules for estimating when prices are involved, is the fluctuation and local differences in cost of labor and materials. Lumber in some places may cost from one to four dollars per thousand feet more than in others, the quality being the same, and labor, while it does not vary so widely as lumber, varies enough to make it impossible to give rules from a central point, that can be relied upon with certainty at points distant from where the estimate is made, so far as the cost of labor is concerned. The local surroundings, too, have something to do with the cost of a building. In some places excavation may be done with ease, the ground being dry and easily handled. In other places the ground may be stony, tough clay, or an inflow of water may prove very troublesome. All these factors should be considered when an estimate for any particular building is being prepared. The following prices at this writing may be taken as a standard where local prices are not obtainable, or difficult to get, but, as has been repeated in these columns over and over again, the estimator should make it a point to arm himself with the actual prices current when the proposed works are to be erected:

Excavation per yard		$ 20
Stone foundation, put in complete, per cord of 100 laid in the wall		8 00
Brick laid in the wall, per M		12 00
Plastering, two coats, complete, per yard		20
Framing timber and lumber, hemlock, per M		11 00
Flooring, ready to lay, per M		17 00
Siding, second clear, 4, 5 or 6", per M		16 00
Sheating and roofing, second, per M		12 00
Pine shingles, per M, best 16-inch sawed		3 00
White cedar shingles, per M, best 16-inch sawed		2 50
Slate, best, laid per square (100 feet)		8 00
Finishing lumber, pine per M	$25 00	30 00
Painting, per yard, each coat		6
Carpenter's wages, per day		2 00
Mason's wages, per day		3 00
Laborer's wages, per day		1 25
Hardwood finish, with hardwood doors, extra over pine per room, about		20 00

Of course something depends on the size of the room and the character of the work; on an average, however, if the estimator has no other data to work on, he may feel fairly safe in adding $20.00 extra over pine finish for each room finished in hardwood, if the room is not above ordinary dimensions. It must be kept in mind, however, that this refers only to the bare wood-work in its natural condition, and not after the painter or polisher has gone over it. Three coat work, in paint, according to the figures, would sum up eighteen cents per yard, or 20 at the farthest; but if the work was finished up in hardwood, filled, rubbed and polished, the same surface might cost from thirty cents to one dollar and fifty cents per yard, a condition of importance to the estimator. A careful examination of the specifications is absolutely necessary when deciding on the cost of wood finishing.

Estimating.

THE frequent enquiries that pour into the office of every architectural or building journal asking for some "short cut to estimating" proves beyond a doubt that many contractors, and would-be contractors are either unable to master a thorough and systematic method of estimating, or are too careless or indolent to enter into all the minutiae of the art—for art it is—and, although the best minds in the building world have endeavored to evolve some quick and easy method of getting at the cost of a building before its erection, nothing satisfactory has been developed. The system of cubing, estimating by comparison, and "jump estimating" have all been tried and found wanting, and the successful contractor has always found it necessary to fall back on his "first love," and estimate his proposed work item by item or by groups of similar items. The following figures, although not correct in every particular or for every locality, may serve in some instances where a hasty estimate may be required. The figures are taken from a number of works on estimating, and are given as "helps in need" where local figures are not to hand:

The price of grates finished and in place, including blower and frame	$12 00
Outside cellar stairs, complete with doors, hinges, locks and fastenings	10 00
Cost of lower floors in dwellings, including joists, bridging and good quality of pine flooring, per square	13 00
Second floors, per square	12 00
Upper tier of ceiling joists, including time and all materials, per square	2 00
Wood copings, per foot	10
Chimney backs, fire clay, each	1 00
Flashings, 14" wide, per foot	9
Plain cornice, composed of matched stuff and fillet, including time, per foot, square	15
Siding, including studding, boarding, papering and time, per square	4 00
Partitions, including studding, two coats plastering, lath and time, counting both sides of wall, per square	6 15
Box stairs, no rail, each flight, including lumber and time	12 00
Stairs with rail, balusters and newel posts	20 00
Inside doors, with frames, locks, etc., each	6 00
Outside doors, with transoms, good mortise locks, bronze faced butts, each	11 00
Average sized windows, with medium weight glass, weights, pulleys, and all complete in place, each	7 50
Base in average sized room, in place	3 50
Shelves in pantry in ordinary style	4 00
Wainscoting per lineal foot, time and material, including cap	26
Conductor pipes and gutters per foot	11
Verandah, including turned posts, tin roof, foundations of posts, painted joints in floor, brackets, spindle work, three coats of paint, all complete, per running foot	4 50
Chimneys per foot, from 75 to	1 00

Per foot according to size and number of flues in each shaft.

Wooden mantels vary in price according to style finish and materials used in their construction, from $8.00 to $100 each, so that the estimator must have some particular style in his mind's eye when he fixes a price for

this work. With the foregoing before him, and the figures given in the first paragraph in this issue, the estimator should have no trouble in determining the cost of a small frame house, so that both owner and contractor will be dealt justly with.

Regarding Stairs. IN making an estimate on stairs of any kind it must always be remembered that there is one more riser than treads in every flight of stairs. This is owing to the fact that the floor at the foot of the stairs and the floor at the landing take the places of treads, though not counted as such. The width of the tread does not include the nosing or projection; thus a 10 inch tread will measure 11½ inches, as the nosing will project from the face of the riser 1½ inches, or at least the thickness of the stuff which forms the tread. The run of a stair is the distance between the face of the first riser to a line perpendicular to the face of the last riser in the flight. The height of the riser always includes the thickness of the tread, so that the first riser must be made narrower by the thickness of the tread than the other risers that are placed above it. In laying out a stair having a "winder" in it, it is customary to make the centre of the "winder" treads the same width as the "flyers" or regular treads. The cost of ordinary stairs, either open or cased, may be obtained by finding the number of feet in each flyer and riser, and counting the steps and risers and strings adjacent, allowing generally one foot in length of string for each riser. Allow for timbering the carriage underneath the stairs, when such work is done. After ascertaining the number of feet of lumber in one step and riser, with one foot in length of strings included, multiply by the whole number of risers in the flight, allowing three straight steps for each winder or swelled step, where there are such. An allowance of two will be sufficient when there is no furring underneath. Allow four for quarter platforms and six for half platforms. No allowance need be made usually for landings unless large. Double the cost of all dressed lumber. Figure pine at 5 cents per foot, oak at 7 cents per foot, walnut at 12 cents per foot. For ornamental brackets of pine allow 16 cents each, and oak or walnut 30 cents each, or per foot of facia if the bracket is continuous. For all hand railing put up plain multiply number of square inches on cross section by 3 cents, which will be the price per foot for pine, and multiplied by 4, will give the price of birch, oak or sycamore, while 5 will give the price in walnut. Crooks, ramps and goose-necks should be figured at three times their length. The prices of balusters, plain and ornamental, and of newels in regular or special styles, may be obtained at any woodworking establishment where a wood-turner is employed, or from regular dealers who make a specialty of wood turning and who will gladly send catalogue of design and price list if applied to.

Specifications. Too much care cannot be taken in reading and studying the specifications for a building of any kind. Often these important documents are very loosely drawn or worded. Ambiguous phrases and misleading expressions find their way into specifications sometimes, that were never intended by the architect to convey the meaning the estimator extracts from them. If the estimater has a "doubt" on any item he is figuring on, he should not send in his tender until that doubt has been made a certainty either on one side or the other. It will not do to let the matter pass on the estimate as uncertain, as it may be an overcharge, and thereby cause a loss of the work, or an undercharge, and cause a loss of money to the contractor. The architect should be asked to explain, and his rendering should be noted as a memo, with day and date, in order to prevent subsequent disputes. With a loosely drawn specification contractors are obliged to bid on a certain amount of chance, and this risk must be paid for by the owner, for it is not to be expected that the contractor will accept a risk without a corresponding remuneration. In a long experience in matters of this kind, we have always found that the more exact the details were in a specification, and the greater amplitude given them, the closer were the figures of competing contractors, and the nearer to a correct value of the work was presented in each tender. On the other hand, it is frequently the indefiniteness of the specification that proves the cause of such divergence of bids. Plans and specifications drawn up and prepared by country carpenters, who have had little or no experience in works of any magnitude, are dangerous instruments for builders to meddle with, if possessed of honest intentions. The number of "outs" and "omissions" and misplaced and alarming phraseology, often prove such a source of endless dispute and contention, that the specifications become a veritable Pandora's box to everyone concerned. Of course, an experienced contractor will read in a rurally prepared specification, a great deal between the lines and protect himself accordingly, but the new beginner should make it a point to have every "foggy" detail made clear before submitting his tender. It does not follow that because a specification may be "hazy" that the drawer of it up does not know what he wants or intends, for as a mechanic and a builder and draughtsman, he may be quite an expert; but the drawing up of a perfect specification requires a quality of a much higher order, the chances of acquiring which seldom fall to the lot of country builders, though it must be acknowledged that under the circumstances our suburban builders perform their mission fairly well.

Concrete and Cement Work. IN estimating the cost of concrete work much depends upon the cost of the raw materials used, the kind of conrete made, and the use it is to be put to. In building concrete is used for several specific purposes, as follows:

1st. Footings and foundations of walls.
2nd. For cellar walls.
3rd. For the walls of superstructures.
4th. For the filling of arches in fire-proof structures.
5th. For cellar floors and walks.

Concrete is prepared in several ways, and of several materials, Portland cement being the base, as follows:

Portland cement used in all cases.

Cement 1 part.	Broken stone 3 parts.	Gravel.. 1 part.	Sand 3 parts.
" 1 "	" bricks 3 "	" .. 1 "	" 3 "
" 1 "	Cinders..... 4 "	" .. 1 "	" 2 "
" 1 "	Pebbles..... 2 "	" .. 2 "	" 3 "
" 1 "	Broken stone 3 "	Cinders.. 2 "	" 2 "
" 1 "	Coarse slag.. 3 "	Fire clay 1 part.	" 3 "

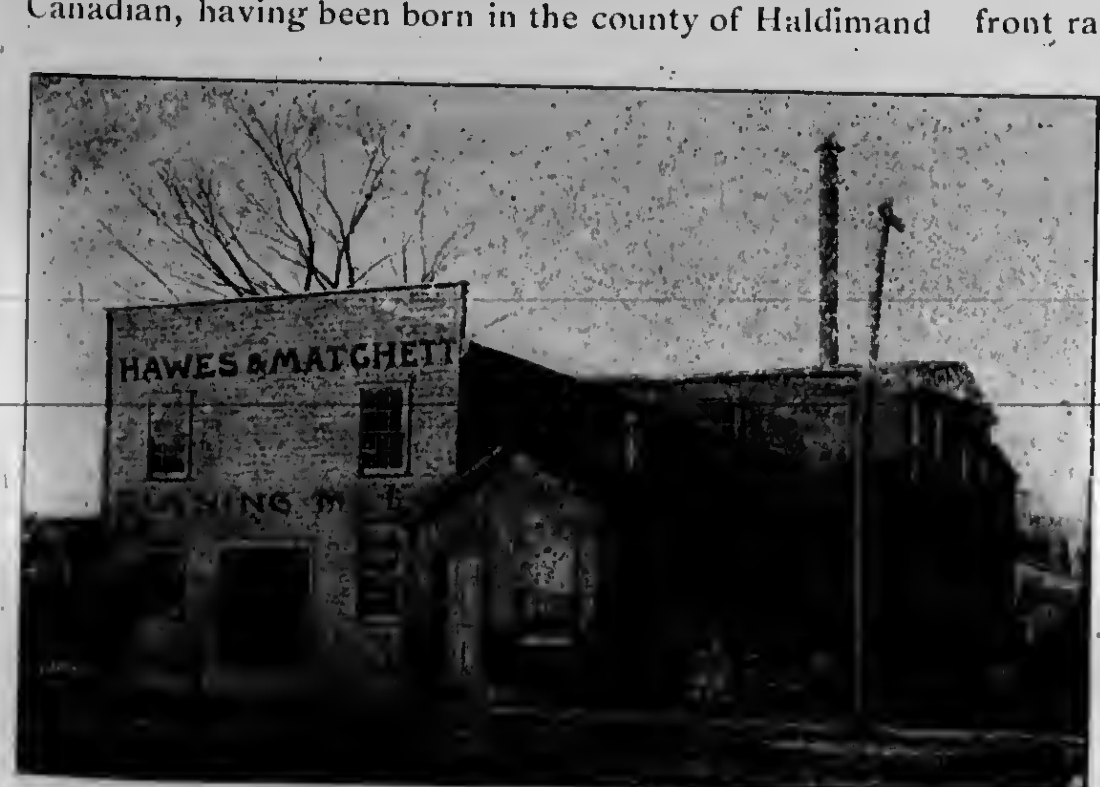
Mixed with clean water.

To the cost of the several ingredients to be worked into the concrete, add the labor of preparing, and the cost of mason's wages in placing in building, as follows: A good laborer will prepare a cubic yard of concrete ready to put into a wall or footing in one and a half hours; a mason will place and ram a cubic yard in half an hour. Concrete is generally measured by the cubic yard or by the superficial yard, according to the kind of work, and the cost is gauged by the cost of material and labor. Cellar bottoms and walks are generally prepared by the use of from 2 to 6 inches of concrete, on the top of which is finished from one-half an inch to two inches of top dressing compound, of one part of best Canadian portland cement, and one and a half or two parts of coarse sharp sand. The cost of this class of work varies from 50 cents to $1.25 per superficial yard, the latter sum being for the best work made, not less than six inches thick, and built in a good gravel or shale base, rating cement at $3.50 per barrel, and sharp, clean sand at $1.00 per cubic yard, mason's wages at $3.00 per day, and laboring man at $1.25 per day. Any change in these prices will, of course, affect the cost per yard of the work.

MESSRS. HAWES & MATCHETT.

OUR travelling representative furnishes some particulars of Messrs. Hawes & Matchett, of St. Thomas, Ont., who, he states, are one of the most progressive contracting firms in western Ontario. Their planing mill and factory, of which we give an illustration, is situated on Ross street, and is thoroughly equipped with modern machinery, thus enabling them to manufacture all the woodworking material required in their work, as well as to do a supply trade with other builders. A large lumber business is also done, their yards adjoining the factory being well stocked with the different grades of lumber.

The firm has been organized for about twelve years. Mr. S. Hawes, the senior member, was born near London in 1846, and after leaving school engaged in several minor mercantile lines until forming the present partnership. Mr. Hawes is held in high esteem by his fellow townsmen, having been elected as alderman for three successive years, then refusing further nomination. Mr. Edward Matchett, the junior member is also a Canadian, having been born in the county of Haldimand



in the year 1852. After leaving school he learned the carpenter trade, working as journeyman until removing to St. Thomas in 1880, where he engaged in the building business until 1885, when he became a member of the present firm. Mr. Matchett, being a thoroughly practical workman, gives his supervision to all details.

Mr. J. Fenn, contracting plasterer, of London, reports prospects for season's business very promising. He has recently completed the interior of the Congregational church, Horton street.

THE LATE G. W. REED.

READERS of this journal will regret to learn of the death of Mr. Geo. W. Reed, the well-known roofer and manufacturer of roofing materials, of Montreal, who formed the subject of a biographical sketch in our January number. In this issue we reproduce his portrait, together with some particulars of his active life. Deceased was in his 69th year, was a native of New Hampshire, but came to Montreal as far back as

THE LATE G. W. REED.

1852, when he entered into partnership with Mr. Raynor, another New Hampshire citizen, under the title of Reed & Raynor, in the slate-roofing business, being among the first to introduce that industry into that city. On the retirement of Mr. Raynor the business was carried on by Mr. Reed alone, who succeeded in building up an extensive business. He was an active member of the American Presbyterian church, from its establishment at the corner of McGill and St. James streets, and besides being an elder for many years, taught in the Cross mission for over thirty years. In business circles Mr. Reed always stood in the front rank, having done much to elevate the standard of business integrity in the community.

AN AUSTRALIAN ARCHITECT AND BUILDER.

WE have recently been favored with some particulars of Mr. J. H. Garratt, of Sydney, Australia. Mr. Garratt is a brother of ex-alderman Joshua Garratt, the well-known contractor of London, Ont., and holds the position of architect and superintendent of construction for the New South Wales Fresh Food and Ice Company, a concern of large magnitude, who are constantly adding to their many branch houses. Mr. Garratt states in a letter to his brother that the building trade of Australia is very quiet. He has recently finished a cold storage factory at Grafton, where over $5,000 per week is paid out for produce, while the factory is only working to one quarter of its capacity. He is about to commence the construction of a $150,000 plant and buildings at Sydney, where the head offices of the firm are situated.

The oldest wooden building in the world is a church at Borgund, Norway. It was erected in the eleventh century, and frequent coats of pitch have preserved the wood from decay.

PROMINENT CANADIAN CONTRACTORS.

III.

B. MOONEY AND SONS.

THE well known and established firm of B. Mooney & Sons is undoubtedly among the largest of those in the contracting line in the Maritime provinces. The subjects of the portraits which are herewith presented are Messrs Patrick and Michael Mooney, the senior members of the firm, of which Mr. Edward Mooney is

MR. PATRICK MOONEY.

a third partner, all being sons of the lately deceased Bernard Mooney, whose name the firm still bears.

Mr. Bernard Mooney came to Canada from the north of Ireland in 1861, and settled for a short time at Musquash, N. B., where he practiced the trade of stone mason, which he had learned in Ireland. After a short time he moved to Carlton and later to St. John, where he settled permanently in 1877. Shortly after the great St. John fire, he opened a brickyard in Fairville, and engaged in contracting, taking a prominent part in the rebuilding of the ruined city, about two hundred buildings having been erected under his direction. His sons, as they grew up, took an active interest in the work, and since his death, in 1890, have carried on the business alone.

The brickyard of the firm now covers over 10 acres

MR. MICHAEL MOONEY.

and turns out daily 50,000 bricks. A new 100 h.p. boiler and 150 h.p. engine are being added to the plant. An average of 110 men are employed the year round, and for some time last summer the staff of workmen numbered 180.

Among the large buildings which the firm have erected in St. John are the following: Centenary stone church, one of the finest edifices in the Maritime provinces; the churches of St. John the Baptist, Holy Trinity and St. Peters; Miserecordie hospital, Aberdeen school, St. John high school, St. John electric light station, Pender's nail works, and the new high school building, the latter just completed and costing in the vicinity of $50,000. Included in the outside work were a stone church at Nelson; the immense Chatham pulp mill on the Miramichi, and a large portion of the town of Marysville, largely owned by Mr. Alexander Gibson. They also built the immense Gibson cotton factory, one of the largest in Canada, which occupies an entire block, with frontage of 418 feet, being 4 stories, with 10 foot basement and requiring 8,000,000 bricks in construction.

Over a quarter of a million dollars worth of business has been secured by this firm in the state of Maine adjoining. They built nearly all the brick portion of the town of Eastport, in that state, and during the summer following the fire of 1887, erected seventeen large brick buildings there.

In civic affairs Messrs. Mooney have taken an active interest and are highly esteemed in the community.

TORONTO MASTER PLUMBERS' ASSOCIATION.

THE Master Plumbers' Association of Toronto met in their rooms in Pythian Hall on Wednesday, the 12th inst., Mr. W. J. Burroughes, president, in the chair. Nine new members were added to the membership. The principal business of the evening was the election of delegates to attend the convention, to be held in this city from July 1st to 3rd inclusive.

The Palmer House has been selected as headquarters for the delegates, and the meetings will be held in Pythian Hall. It is expected that every part of the Dominion, except probably British Columbia, will send representatives.

Messrs. W. J. Burroughes and A. Fiddes, on behalf of the Toronto association, will represent the National Association, and the following the Toronto Association: Geo. McGuire, Alex. Purdy, Jas. B. Fitzsimmons, K. T. Allison, Jas. Wilson, with the following as alternates: C. H. Beavis, Robt. Ross, W. Inwood, J. W. Dram, J. H. Parkes, Geo. Wallis.

THE ARCHITECT IN HIS RELATION TO THE PLUMBER.

BY W. J. BURROUGHES, TORONTO.

IF there is any one thing that we can be said to know better than another, it is the fact that in all ages of the world, and in every state of human development, Man has been subject to the same natural laws—that is, his respiration, assimilation, nutrition and excretion have not been materially changed either by legislation or civilization. True, it does not require a very large amount of knowledge to realize this, but it is always wiser to know a little and know it well than, like a bubble, inflated with too much knowledge, suddenly collapse into ignorance. We are able to assert, therefore, without fear of contradiction, that city ordinances have never been able to control digestion nor change either the quantity or quality of man's excretions, the removal of which must be provided for in some way. We are so certain of this that, while we admire the majestic ruins of ancient cities, and are lost in wonder at their stupendous evidences, not only of the existence of a swarming population, but also of superior mechanical arts, we require no peculiar inspiration to enable us to determine with equal certainty the co-existence of sanitary science; because Nature's laws, in every age and among all people, bave required that provision be made for the waste and excretion of the body and a proper supply of food, water and air.

We also know from experience that the larger the number of people collected together in communities, the more imperious becomes the demand. But those ancient people, together with their arts and civilization, have passed away, leaving us only the magnificent remains of their marvelous architecture from which to conjecture the extent of the sanitary science required in order to have preserved the general health and supplied their densely populated cities with the necessary water, air and sewage.

We learn of the architects, for many of them put their trademark on their work or had their faces chiseled in the marble, but nobody appears to have remembered the plumber. Is it possible that history has been repeating itself in its neglect of that worthy class of artisans always? Yet, we are confident that the great Teta, the architect of the pyramid of Cheops, and the twenty-two architects whose names are preserved in Egypt, Ballbec and Thebes, to say nothing of those who designed the monuments and palaces of Palengue and Uxmal, the hanging gardens of Babylon, or the convenient dwellings of Ninevah, must have had the aid of the sanitary plumber. We say must, unless, indeed, those ancient architects were better or differently educated in sanitary science than many of them are now-a-days. Be that as it may, their sanitary arts and sciences, together with their first-born children—the plumbers—got lost, so long and badly as to leave no records behind them.

After the fall of the Roman Empire, man drifted into darkness of superstition and ignorance; science was forgotten and the arts abandoned; whole communities neglected the simplest laws of cleanliness and hygiene; pestilence and death stalked hand-in-hand over the earth, sweeping away its millions of appalled and helpless victims with relentless fury and persistence.

As imperfect as our modern sanitation of cities may be, we can scarcely imagine in a civilized city of the first class, a plague like that of Egypt in 1792 or Barbary in 1799, with a death rate of 3,000 a day, or Bassona, in Persia—and all from causes now considered within the easy remedial reach of sanitary science. The great pestilences that nearly depopulated Europe during the sixteenth and seventeenth centuries became the cause of a revival, or rather, the creation, of a sanitary science; for when investigation had brought to light the terrible sanitary conditions by which the evils had been produced, and men began to realize the accumulated horrors of the situation and tho imperative necessity of a remedy, the next step was to formulate the results of experience into science, which was done; and so well was it done that the average health of cities has been vastly improved and the duration of human life prolonged—and we have done it all ourselves, without the aid of the ancients. It is a source of some pride that sanitary science, with its long train of useful arts to ameliorate human conditions, is exclusively of our own invention. It is true, we were forced into it by a necessity which knows no law, excepting the laws of nature, of which self-preservation happens to be the first; but still we have accomplished our duty as well, perhaps, as any other department of science having for its object the advancement of man's physical welfare. By WE, I mean the plumber, in contradistinction to the architect.

With a proper regard for the proverbial modesty of a worker in lead, and due deference to the grandeur and dignity of architectural achievements, we humbly submit that the modern improvements in the art of sanitation are due to the labor and experience of the long-suffering plumber rather than the intellectual efforts of the artistic and skilled architect. The inference is, therefore, clear that in the onward march of sanitary science the time has arrived when the plumber should take his place in the procession to which he is by right entitled as minister-in-chief. In the necessary and logical order of things, custom has long since entrusted the sanitary welfare of the community, and held alone responsible for the shortcomings, of the man who does the work. The architect, however learned and skillful, may design palaces, and princes may have them erected, which, but for the aid of the sanitary plumber, would become reeking hot-beds of disease and pestilence. It is to the plumber that all questions arising from defective drainage, sewerage, etc., are referred, and, whether justly or unjustly, he is alone held responsible for the evils of bad plumbing, and too frequently made to bear the sins of others. Now, the grand object of the organized agitation of our Guild is, so far as possible, to remedy the evils and elevate the sanitary art in behalf of the public as well as ourselves. Our desire is to render the plumber competent to meet the varied duties and responsibilities not only presupposed, but made necessary by the practice of his art—in brief, to make himself a worthy executor of an honest art and dignified science, and even to invoke the aid of legislation if necessary in order to more effectually insure results. In order to achieve this it is necessary that the working army of reform be properly disciplined and officered, and the duties fairly and wisely assigned. Our relations with the architect, builder and doctor, should be clearly defined, and each class be made to bear their respective burdens. Our present affair is with the architects, and our duty is to examine dispassionately the relations we occupy with them, and decide what changes are necessary, if any. Presupposing that the educated plumber is his own sanitary engineer, it is evident that to him will be referred all questions of drainage, sewerage, light and ventilation, and especially the practical methods whereby the best results are to be attained, all of which are but incidental in the studies of the architect while they constitute the life and business of the plumber.

Let us look into the facts a little. The investigations of science into the causes of pestilence and the search for remedies, from which investigations sprang sanitary science, revealed facts no less curious than important. We recognize the great central fact that all matter is but the different arrangement of a few simple elements into the absolutely innumerable forms of use and beauty, and that from the lowest to the highest form of organized matter. Each is but a laboratory, which changes the material arrangement and hands it on to the organisms above it; each returning the waste to the earth and air to recommence the work in never ending cycles—not that this knowledge was necessary to enable the plumber to fit up a water closet, but to give birth to a new science, whereby the plumber's art is hereafter to be directed and developed. When Moses by Divine command instructed the children of Israel to make the first earth closets on record by covering their excreta with earth by means of a paddle which each was ordered to carry for the purpose when on the march. But when they came to be gathered into cities Moses was confronted with a series of sanitary problems that became more and more difficult of solution as the population increased, and they were precisely the same problems that bring the plumbers to the front to-day. The removal of excreta and waste of cities is not left to the leisure or discretion of anybody, but is absolutely compulsory, and proper supplies of water and air equally so, for reasons too obvious to require mention. The question that we are called upon to answer, therefore, refers to the methods best adapted to promote the public health on the one hand and to counteract the evil results of a false economy on the part of ignorant plumbers, shoddy-builders and mercenary owners on the other..

Our duty and business interests both demand that we face the situation openly and boldly, neither underrating the difficulties before us nor deferring to vicious customs or traditional authority. It is no secret that one of the disabilities by which the practical sanitary artisan is often hindered is his false relations with the architect, relations which the sanitary experience of modern cities demonstrates should be at least modified if not reversed.

An architect is not necessarily a plumber, and is seldom practically familiar with the laws of sanitary science, and still less with plumbers' devices, methods and materials. It cannot, however, be denied but that many of the architects have given the question of sanitary plumbing a good deal of thought and consideration, some of whom (in our own city) have done more to advance the cause of good plumbing than many of the plumbers themselves. Architects are always careful whom they select to carry out their plans, in order to secure the best possible results. Yet the architect's plans and specifications are generally prepared without consultation with the plumber, who is expected to do the work, and who alone is held responsible for its efficiency, not only by the owner, but by the public.

Let us not be misunderstood here. With the architectural beauty of a building or of the building materials, the plumber has nothing to do, but with its water and air supplies, its many and varied fixtures, its piping and drainage and sewerage, he should have everything to do. In some cities, and forsooth in many of our government buildings it is customary for a builder to undertake a whole or lump contract. The builder sub-lets the plumbing, not to the best, but to the lowest bidder, who, in order to save himself, puts his whole mind on the arts of substitution, and how not to do things and still keep within the letter of the specification. The chief sufferer in the affair is the confiding owner, who, perhaps, finds his costly and magnificent dwelling little better than a whited sepulchre. This is no fancy sketch—it is history enacted in large cities every day, and tends to bring about results which are humiliating to the plumber, and by no means creditable to sanitary savants. That the plumber has too long permitted himself to occupy the position of the humble mechanic, asking leave to carry out the designs of his superiors as cheaply and showily as possible, and is expected submissively to grin and bear the popular abuse heaped upon him and his art by those who feel outraged by somebody, and make the plumber the scape-goat, cannot be denied,

There is no conflict of interest whatever between the architect and plumber, but they both need to be educated to a realizing sense of the situation. The plumber of the future will be required to conjoin his art to science and elevate them both to the dignity of a profession which will command the respect of the architect. Apparently it is too subversive of the long established relations between the intellectual designers of palaces and the heretofore dirty plumbers who have been trained to perform the double duty of drudge and scape-goat. And we do not expect the enmity of cheap people whose evil methods we hope to reform, will be conciliated at once or easily; inovations upon any established customs are always opposed by those whose trade or occupation is hindered by the improvement. This is also history. But the difficulties before us should stimulate more determined effort and encourage us to the inauguration of a more harmonious co-operation between architects and plumbers. By this means public interest in the progress of sanitary science will be inspired, and the confidence of the people gained; it will be easy to secure a wise system of legislation, in order to perpetuate and multiply the sanitary advantages we shall have inaugurated. Fortunately—if I may use the word in a case where the accumulated misfortunes arising from the evil sanitation of cities have been our schoolmasters—we are in some degree prepared for improvement. For nothing is more certain than the facts we have mentioned concerning the origin of sanitary science. Not only the public generally, but architects, doctors and plumbers have acquired, through misfortune, the rudiments of a sanitary education, whereby our contemplated revolution will be rendered easier. It is also most probable that the real or fancied interests of the trade will interpose vexatious obstacles in the way of any change. But neither architects, doctors or plumbers, or the shrinking public disagree as to the existence of great sanitary abuses that cry aloud for reformation, and none dispute the fact that the proper education of all concerned is the rational course to be pursued. Educate the plumber by force of law if necessary, if it cannot be accomplished otherwise, so as to enable him to execute a wise system of sanitary legislation, and all the rest will follow. To the master plumbers will then be entrusted all matters pertaining to sanitary art, and the plumbing of buildings will not be planned without his counsel. One more point it is well to suggest. As the plumbers' work is subject to especial criticism on all hands, therefore justice and common sense, under the coming dispensation, will demand that no Board of Health, either provincial or municipal, shall be complete without at least one master plumber. We have everything to hope for and nothing to fear; if we are sincere in our intentions and earnest efforts we shall succeed. Let us secure an efficient system of legislation, and the foundation will be laid for our sanitary superstructure. The architects will give us the plans; we will see to it that proper drainage shall carry away all noxious elements, and our friends, the doctors, may stand by and approve.

Glass bricks are made extensively in Germany. They are blown with a hollow center, containing rarified air, and are said to be as strong and durable as clay bricks. They freely admit light. So far the glass bricks has only been used in the construction of conservatories.

WORKS OF CONSTRUCTION.

Mr. J. Whittaker, slate roofer, London, reports good trade in his line, and has a largo number of contracts already booked for this season. Mr. Whittaker has been engaged in the roofing business for the past two years, and in that line has built up a very large trade.

The corner stone of a new Methodist church was recently laid at Simcoe, Ont., the erection of which is in the hands of Mr. M. W. Hoyt, of Brantford. It will be 70 x 50 feet, with Sunday school room 60 x 50 feet, and two stories high. The floor and seats will be built in amphitheatre style with a floor elevation of 2 feet 6 inches. A circular gallery will run across one end. The seating capacity will be about 700.

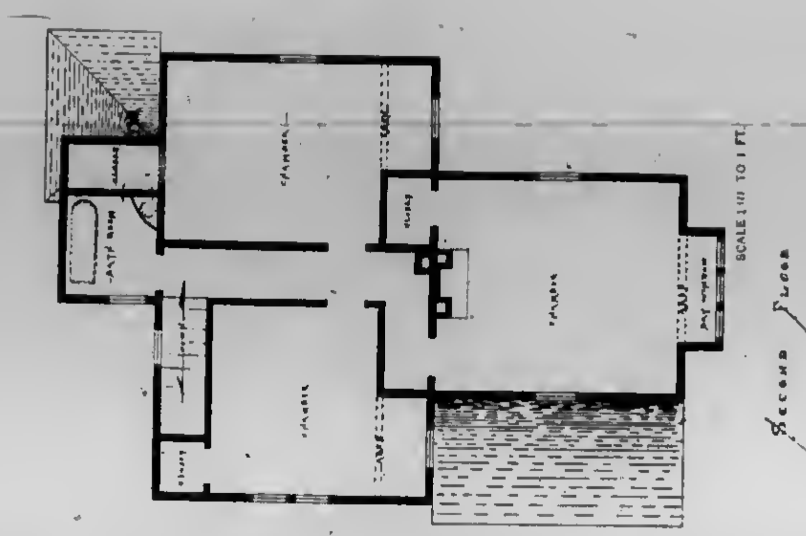
A oew opera house has been completed at Rat Portage, Ont., from the plans of Mr. G. A. Mitchell, of Winnipeg. The building is 150 x 50 feet, four stories high. The front part will be used for a hotel, while the opera house proper will be in the rear, 50 x 80 feet, entered through a large corridor panelled in British Columbia cedar. The stage is 24 x 48 feet, and from the floor to the gridiron is 43 feet 4 inches. The roof is a mansard and covered with metallic shingles. The cost was $22,000.

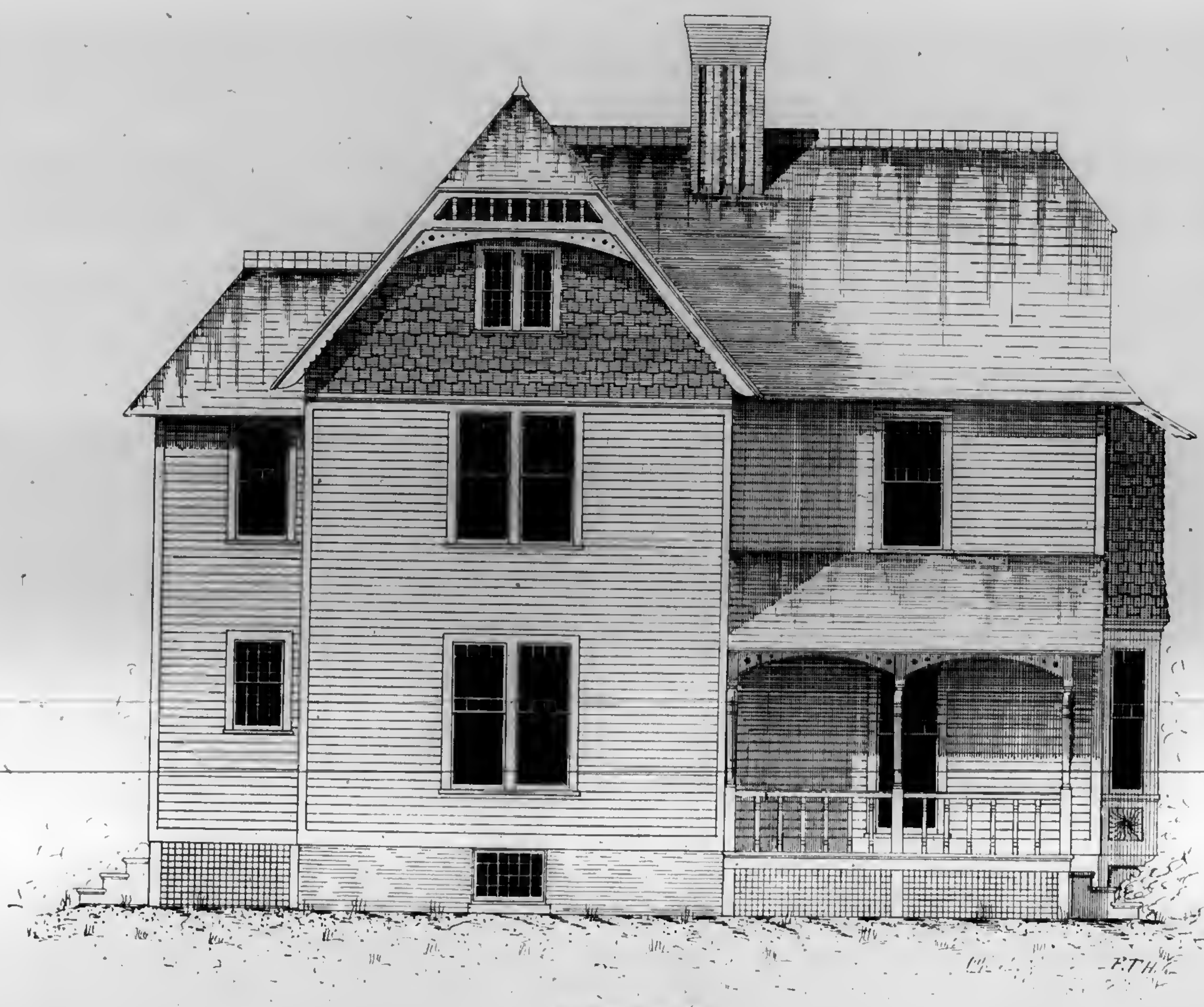
A large block of stores, covering 100 x 100 feet, is heing erected at Fort William, Ont., for Mr. Joseph King. This will be one of the finest blocks in that town, having a most imposing front three stories high by 100 feet wide, which will be entirely constructed of galvanized iron made to details prepared by Messrs. Arnoldi & Ewart, the architects, of Ottawa, and executed by the Metallic Roofing Company, of Toronto. The exterior will be covered with "Special" single stone rock faced siding in different sized courses while the interior will be furnished with embossed steel ceiling.

The new Southern Congregational Church at London, Ont., was recently opened. The building cost $4,000, and has a seating capacity for 500 persons, with a large basement. The foundation is of stone and walls of white brick, while a small, slate-covered tower is located in the centre of the front. There is a small gallery at the rear of the auditorium, and a gradual rise of the floor from the altar to the entrance. The architect was Mr. Herbert Mathews, and the contractors: Moran & Ridge, brickwork; Hessel & Davidson, carpenters; McLaren, Parkinson & Co., heating; John Fenn, plastering; George Lewis, painting.

In response to a question of a member of the City Council, Mr. E. J. Lennox, architect for the new municipal buildings in Toronto, stated that the Council might hold a meeting in the chamber by November next. There were now 241 men employed on the work, including 78 plasterers, 45 carpenters, 67 steamfitters and plumbers, 30 bricklayers and 21 excavators. By the end of May the number would be increased to over 300. Work on the tower will be commenced again at the end of the present month, the delay in this part of the work being caused by the lack of stone supply. Thirty feet of stone and fifty feet of wood have yet to be put on the tower.

FRONT ELEVATION



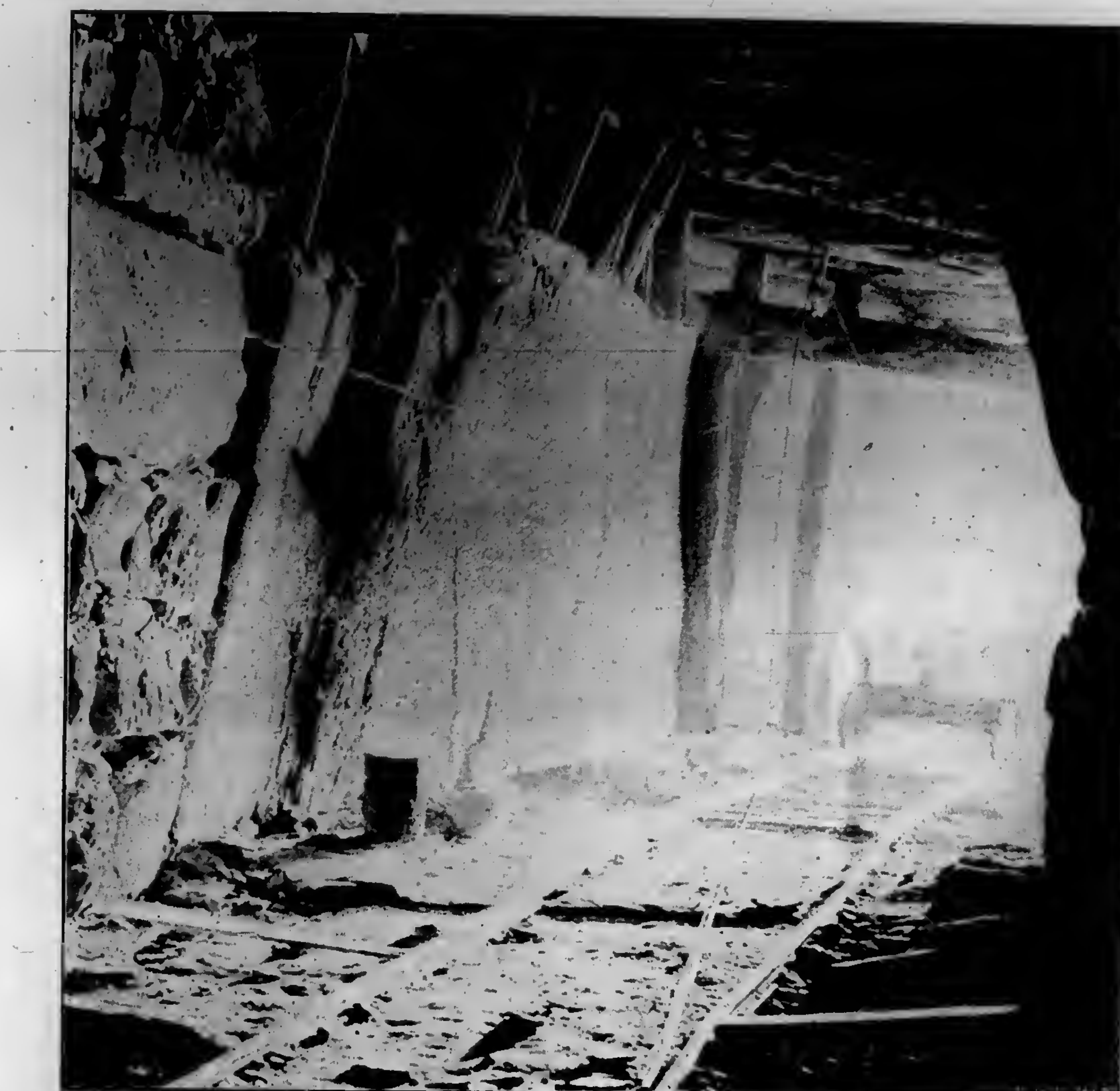


SIDE ELEVATION

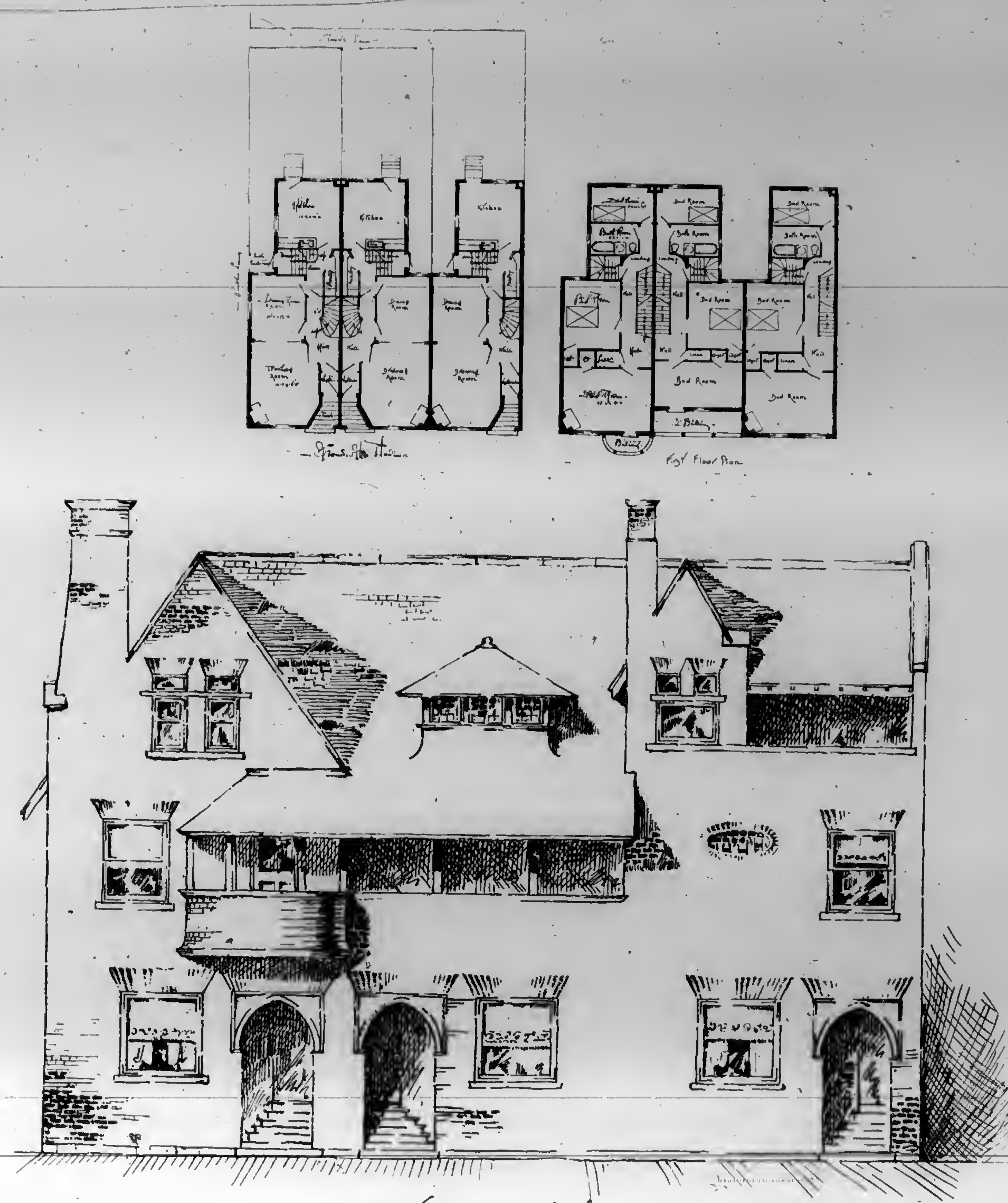
A PROPOSED SIX-ROOM AT COLLINGWOOD, ONT.

FRED. T. ARCHITECT.

Church at Quebec.
Messrs. Vallée & Tanguay, Architects.



Exterior and Interior Views of The Credit Forks Mining and Manufacturing Co.'s Sandstone Quarries, Credit Forks, Ontario.



— Front Elevation —

Three Attached Houses
Scollard St. Toronto
April 1894 Dick & Wickson
Architects

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CANADIAN ARCHITECT AND BUILDER.

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CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

Legal Decisions.

DECISIONS of the Canadian courts in cases of dispute between architects, builders, owners and supply firms, are of particular interest to the readers of this journal. A knowledge of precedents in cases of this description is likely to be the means of preventing waste of money and time in legal controversies. If each of our readers would contribute to our columns particulars of decisions in cases of this character with which he may have been connected or become acquainted, the information will be gladly published for the benefit of all.

Extended Privileges for Women.

AN impetus has been given to the ambition of female students of art by the recent decree of the French government granting women admission to the classes of the Ecole des Beaux Arts. The decree provides that sixty female students between the ages of eighteen and twenty-five shall be granted this privilege after having, by preliminary examination, given proof of artistic acquirement. The same course of study has been assigned to women as to men, and until the success or otherwise, of the new departure shall have been proven students of both sexes will pursue their studies together. Should a sufficient number of female students make application for admission to the school, however, special accommodation will be provided for them. Women have already distinguished themselves in the field of art. With the privileges for study now placed at their disposal, conjoined with their natural adaptability, they may be expected to achieve greater things in the future.

Reduced Cost of Building.

REFERENCE was made in these pages last month to the greatly reduced cost of building in Toronto at the present time as compared with a few years ago. While local circumstances have doubtless had something to do with changing the conditions in Toronto, a substantial decrease appears to have taken place in the cost of building throughout the United States as well as Canada. The American Architect, referring to this subject, states that in 1872 the cost of bricks laid in the wall was reckoned at $36 per thousand. To-day, with better materials, the cost is only $15 per thousand. It is stated that owing to the abnormally low price of materials at present prevailing, the cost of building is less on this continent than in Europe, notwithstanding the much lower scale of wages paid to workmen abroad. There is good reason to believe however, that prices of

materials have reached the lowest point, and that with a revival in business conditions will come a rise in prices.

The Duty on Cement.

THE Dominion government is said to have been impelled to substitute an ad valorem duty for the specific duty formerly imposed on imported cement, by the fact that foreign cement was being brought into the country in barrels 475 pounds in weight, with the object of materially reducing the duty of 40 cents per barrel. It such a practice existed under the old tariff, it cannot continue under the new. The present duty is 12½ cents per 100 pounds, which, taking a barrel of 350 pounds as the standard, is little greater than under the former tariff.

A Suggestion to Architects.

WE beg to suggest to the Toronto Chapter of Architects the desirability of organizing a bicycle sketch club. While the regular meetings of the Chapter have been called off during the summer, the interest of the members might be maintained and many pleasant and profitable outings enjoyed, if bicycle sketching parties were organized. No doubt interesting material for sketches and photographs could be found within a day's ride of Toronto. By this plan, the students would be given the opportunity of showing their ability with the pencil, and of collecting useful ideas; while the practising members of the profession could, as it were, live their youth over again, and afford assistance to those who in the future shall fill their places.

Legislation Affecting Buildings.

OUR readers will no doubt be interested in particulars of several important measures affecting the building interests which have lately been introduced in the legislature of the state of Massachusetts. One provides that 80 feet shall be the limit of height of buildings, other than public buildings, to be erected in Boston in the future. Another authorizes the use of concrete for all kinds of building construction, provided the quality has been tested and found satisfactory by the American Society of Civil Engineers. It is provided in another Bill that before permission is sought for the erection of stables, advertisements must be inserted in the newspapers and notices served on the owners and tenants of adjoining buildings. The erection of bay and oriel windows over any public road or square is prohibited, and it is proposed to repeal present legislation compelling annual registration by plumbers, the working of the regulation not having proved satisfactory.

Life of Brick Pavements.

REFERRING to letters of correspondents appearing in these pages regarding the relative advantages of various kinds of paving materials, the question is one which should only be decided in the light of local circumstances. The amount and character of the traffic to which the pavement will be subjected is a most important factor in deciding the choice of material. For residential streets vitrified brick appears to be in most favor in Toronto at the present time, while for business thoroughfares asphalt and granite setts hold first place. With a view to reducing the cost, the proposal has been made to lay the brick on a foundation of sand or gravel instead of concrete. There is reason to believe that work done in this manner would give satisfactory results for perhaps a period of eight or ten years in a city like Toronto, where the soil is dry sand, but under different conditions the experiment would be attended with risk.

Architectural Competitions.

THERE is something to be said in favor of architectural competitions for public buildings, when conducted under proper conditions. When, however, they are either devoid of conditions, or drawn with the deliberate purpose of placing the competitors wholly at the mercy of those for whose benefit the competition has been instituted, they are a source of great injury to architects and architecture. In Canada competitions have been rapidly degenerating, until they have reached a plane so low and unjust that no self-respecting architect should have anything to do with them. A somewhat similar condition appears to obtain in the United States, and some of the leading architects have wisely determined to make an effort to check the evil. With this object an agreement has been signed by the principal architects of New York and Boston, binding them not to take part in architectural competitions except on certain specified terms. It is to be hoped that this movement will spread until it shall embrace all the leading architects of the country, so that the public may know that a competition not based on proper conditions will be entered only by architects of second or third rate standing. Canadian architects are making a tremendous mistake by not grappling with this evil, instead of assisting to perpetuate it by entering, as many of them do, every competition regardless of terms. In the majority of instances, whether they win or lose, they reap nothing better than disappointment, and the feeling of having in a measure sacrificed their self-respect. Even in cases where some slight pecuniary advantage is derived, it is at the future expense of the architect and of the profession as a whole, the status of which is gradually being lowered in the eyes of the public. The architects have the remedy for the present condition of affairs in their own hands, if they choose to exercise it. It is for them collectively, but especially as individuals, to say whether this evil shall be allowed to go from bad to worse, or whether, by refusing to enter competitions except under fair terms, they will stamp it out.

Lessons of Recent Fires.

RECENT conflagrations in Toronto and elsewhere have drawn attention to the inadaptability to resist fire of the methods of construction employed in many of our modern store buildings. The statement has been made, so far as we know without contradiction, that in the case of the fire which recently destroyed one of the large departmental stores in Toronto, the walls of the building fell in within fifteen minutes after the sounding of the fire alarm. The building is said to have been originally intended for residence purposes. Three or four years ago it was extended in size and height and fitted up as a departmental store. Unfavorable comment was heard at the time regarding the constructional features of the building and doubts were freely expressed as to its safety. Whether or not these were well founded, the structure was certainly not adapted to withstand for even a reasonable time the action of fire. This brings us to consideration of the important question of the means to be employed to reduce the fire hazard in modern store buildings. As a first step in this direction the outer walls should be strongly built of hard burned bricks or other fire-resisting materials, thus preventing the lateral spread of fire to adjoining structures. The vertical and horizontal supports, elevator shafts, etc., should be enclosed within fireproof material. Large light wells extending through the several floors from bottom to top of building should be prohibited. Fireproof rolling partitions should be employed to divide the immense floor space at night into smaller areas. Until means are found to reduce the great floor area filled with highly combustible materials, in buildings of this character, they will fall a speedy prey to fire, and prove a source of great danger to property in the locality in which they are situated. Means must also be found for protecting the plate glass fronts of such buildings, otherwise it will be of little advantage to make fireproof the side and rear walls and inside of the structure. It is due to the rights of property owners on business thoroughfares where these large stores are located, that the civic authorities should impose restrictions which would tend to make them a less source of danger to life and property than they have hitherto been.

BY THE WAY.

THE Engineering Magazine for June contains an illustrated article by Mr. Allan Ross Davis, descriptive of the Trent Canal. The author concludes by expressing the opinion that the United States should unite with Canada to make the Trent Valley Canal route, the Erie Canal route, or best of all, the Welland and St. Lawrence Canal route, a highway adequate for the requirements of both countries.

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IT is estimated that one-third of Paris is built over caverns formed by the quarrying of the fine building stone of which the city is constructed. Many thousands of piers have been built in these caverns to give the necessary support to the buildings erected above them. Numerous inspectors are likewise employed to patrol these subterranean galleries, with the view of avoiding accidents, such as the one which occurred in 1770, when several buildings sank into the cavities.

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The value of vitrified brick as a paving material has greatly broadened the field of the clay manufacturer. A still more recent discovery is the fact that hard-burned clay conduits are well adapted for the insulation of underground electric wires. Vitrified clay conduits are being used for this purpose by the Chicago Edison Co., of Chicago, and the Western Union and Bell Telephone companies of the United States. There is a hint here for our enterprising clay manufacturers.

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THE celebration of the Queen's jubilee has given a decided stimulus to many lines of business in Great Britain. The building trades in London have derived large advantage as the result of the many improvements which have been made to buildings on the leading thoroughfares. An army of workmen have been employed in the erection of scaffolding necessary to afford sight-seers a view of the great procession, while painters and decorators find their services in demand as never before.

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THE Niagara Falls Paper Company's new brick chimney is receiving attention as an example of speedy construction. It is 160 feet in height, 16 feet square at the base and 13½ feet in outside diameter at the top, and is said to have been erected in 153 hours. An outside scaffold was employed for its construction, all the bricks and mortar being elevated by a double steam-operated elevator. If anything approaching or surpassing this feat of rapid workmanship has been accomplished in Canada, I would be pleased to have it brought to my notice.

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THE Pension office building at Washington is declared to be the largest brick building in the world. Its rectangular base is 400 x 200 feet. The exterior measurement is 316 x 116 on the inner court. The height from floor to glass roof is 89 feet. Each of the supporting columns is 25 feet in circumference at the base and contains 100,000 bricks. The first story walls are 3 feet thick and 2 feet 2 inches above. The interior of the building is divided by brick partitions into 170 rooms. The total number of bricks used in the construction of the building was 15,500,000.

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IN CONNECTION with the celebration of the Queen's Jubilee in London, a number of arches have been erected in the streets by the several colonies of the Empire. These arches are supposed to be characteristic in design of the countries which they represent. The Australasian memorial is to be a wide Gothic arch, stretching across the street and the footpaths. The upper portion is in the form of a gilt balustrade, surmounted by kangaroos. Below them is a frieze of mother-of-pearl shells, which will make a brilliant show when the arch is illuminated with electricity at night. Aptly signifying the movement for Australasian federation will be a royal shield charged with the arms of the various colonies. The African arch, rich in its splendour of ivory and gold, is to be decked with the heads of springbok and koodoo, and waving ostrich plumes. We are told that the Canadian arch is ingenious. Spikes of ice surmount it, and coming downwards with the changes of the climate there will be snow-covered trophies, flowers and golden fruits, with fish in nets to indicate a native industry. The flowers, golden fruits and fish are right enough, but the spikes of ice and snow-covered trophies might with great advantage have been omitted. In view of such displays of stupidity on the part of persons entrusted with the duty of advertising Canada abroad, is it any wonder that Rudyard Kipling should feel himself inspired to write an ode to "Our Lady of the Snows?"

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NEW YORK boasts of the narrowest house of which I have heard as yet. It is situated at the corner of Lexington avenue and Eighty-second street, and occupies a lot 5 feet in width, by 104 feet in depth. The structure really includes two houses, each having an area of 5 x 52 feet. Architecture and Building prints the following description of these unique buildings: "The houses are of pressed brick, with white marble trimmings, and two walls of decorative tiles run up the front. The longitudinal walls are 8 inches thick, and the cross-walls, which sustain the girders, are 12 inches thick. While the houses are only 5 feet wide or deep, fully one-half of their length is increased to a width of 10 feet by bays, which project from the main wall nearly at right angles. These bays are three in number, the central bay being divided and affording an entrance to either house. The front doors of the houses are, therefore, close together. They are very narrow doors and lead to an interior hall, 8 feet 6 inches long, by 9 feet 8

inches deep. One-half of this hall is taken up by a semi-circular stairway, which runs to the top-floor. From the hall a passage-way 14 feet long and 3 feet 8 inches wide leads to the one room on each floor, which room about 18 feet long by 9 feet 8 inches wide, is formed by the expansion of the second bay. Beyond the room another apartment, 3 feet 8 inches wide and 7 feet long, is used, on the first floor, as a bath-room, and on each of the three upper floors as a closet. Thus there are in each house five fair-sized rooms, five large closets, five passageways and five halls. The passages and stairways occupy rather more than half the available space.

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I FIND in the Engineering News an interesting description of the methods employed to move 51 feet and raise 5 feet 6 inches the Emmanuel Baptist Church, of Chicago—a stone structure 93 x 161 feet, with two gables, each 100 feet high, and a tower, 225 feet high. Tests were first made to determine the loads the earth would bear without settling. Over the space to be traversed a floor of 12 by 12 timbers was laid. On this floor a superstructure of jack screws, timbers and I-beams was constructed. Altogether sixteen hundred rollers and 135 tons of rails were used. It was calculated that the ground and timber supports would settle as the load came on to them and an up-grade of two inches in thirty feet was given the track. Care was taken to have the rollers and steel of the same hardness as the track rails, so they would not flatten and wedge. To prevent the rollers from twisting out of line, the lining was so constructed in plates that after a foot or so of travel each roller was released, and could be put in again in exact line. To apply the power for moving the building a strong timber was fastened as an anchorage. From this anchorage chains extended back to hold the timbers which acted as a footing against which the jack-screws pushed. Altogether sixty jacks were used. They were so arranged as to distribute evenly the pressure along the side of the building. The average progress was nine feet per day. No damage was done either to the interior walls of the building or any other part, not even a crack being discovered from top to bottom.

MONTREAL.

[Correspondence of the CANADIAN ARCHITECT AND BUILDER.]

COUNCIL OF ARTS AND MANUFACTURES OF THE PROVINCE OF QUEBEC.

The Schools of the Council of Arts and Manufactures of the Province of Quebec are closed till November. The classes devoted to the building arts established in 1873 have steadily increased in numbers and interest, showing that the system of instruction has been appreciated in this and other cities where these schools are established. The work has been distributed for the best advantage of the country.

In visiting the annual exhibition held recently in the Lecture Hall, Monument National, I was much astonished and interested at witnessing the progress achieved by these classes, and cannot too highly recommend the system of instruction.

The cities represented are Montreal (where the exhibitions are held), Quebec, Levis, Sherbrooke, St. Hyacinthe, Sorel and Three Rivers.

The Free-hand Drawing class had a complete collection of free-hand drawings well studied and rendered. This class comprises 130 pupils, under the supervision of Mr. E. Dyonnet, A.R.C.A.

The Architectural Drawing department is under the charge of Messrs. H. J. Peters and G. A. Monette, architects, who teach geometry and projections, plans and elevation of buildings, etc., to 45 pupils. This class exhibited some finely executed drawings.

The Mechanical Class is conducted by J. V. Graham, and has contributed a fine collection of drawings. The attendance comprises 43 students.

The Modelling Class is very creditable to the instructors, Messrs. L. P. Hebert and Jos. Gratton. Mr. J. Piche exhibited a "Chimere," a very nice piece of work; M. J. Leprohon, "A Female Bust" and M. E. Soucy, a "Venus de Milo," in which was displayed artistic and creditable modelling.

M. J. Peard is the Professor of the Plumbing Class. Very creditable work done during the last season was exhibited. The attendance at this class number 48 pupils.

The Lithographing department was well represented by creditable examples. The attendance during the last session was 18 pupils, having at their head Mr. J. A. Harris. I have had the privilege of seeing the diploma which the Council of Arts and Manufactures are to give in the future to the pupils who will attend regularly the courses. This diploma has been executed by the lithographing class.

I may further mention the exhibit of the Pattern Making Class for boots and shoes, of which Mr. C. A. Payfer is Professor. In the Stair Building and Building Construction Class, conducted by Mr. S. H. Blouden, and composed of 18 pupils, the work of Messrs. L. H. Tremblay and E. Desormeau are worthy of mention. The results of the last session, as shown by the character of the exhibits, have been very satisfactory to teacher and pupils. Every young man and workman should take advantage of the opportunity offered by these classes to qualify themselves to become intelligent and skilled artizans.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The above illustration is a half size reproduction of the successful drawing in the recent P.Q.A.A. competition for an Association Seal.

The Committee of the province of Quebec Association of Architects to consider designs submitted on different occasions is composed this year as follows: A. T. Taylor, president; J. F. Peachy, 1st vice-president; A. Raza, 2nd vice-president; Jos. Venne, secretary.

The Association have recently presented to the Mayor and City Council of Montreal a petition to appoint an Art Standing Committee. Few will be inclined to question the beneficial results that should follow the appointment of such a committee. Employment of artistic thought for the beautifying and embellishment of a city ought to be represented in the erection of monuments, statues, etc. Unfortunately, at present there is no special committee of this kind. I hope the petition will meet with approval. The appointments will be purely honorary and with no emoluments attached. This petition has received the hearty approval of prominent citizens, and their signatures should be a guarantee of success.

Messrs. Albert Guesnard and Theo. Daoust, architects, have formed a partnership with office in Montreal.

The City Council have again under consideration the paving question. During ten years the expenditure for pavements alone has amounted to $2,651,740. In 1896 the Road Department expenditures were $251,435. It is to be hoped that if further expenditures in this direction are undertaken, past experience will lead the Council to secure a guarantee from the contractors of the durability of the work.

Mr. C. H. Acton Bond, a promising young architect who served a large portion of his studentship in Toronto, has entered into partnership with Mr. Sandford Fleming Smith. The new firm will have offices at 185 St. James street, Montreal.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

GRANITE AS A BUILDING AND PAVING MATERIAL.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR:—I was interested in reading an article with the above heading from the pen of "Experience." Everyone can agree with "Experience" that no building looks as substantial or wears as well as a granite one. That granite lends a solid appearance to a building, and that it is the best that money can buy, is equally true, but, when the same statements are made concerning granite blocks, for paving purposes, there is not the same reason for agreeing with your correspondent.

The average citizen considers that granite blocks will last for a lifetime, but statistics taken in New York show that the life of the best quality of granite pavement laid on concrete foundation is only from 12 to 15 years, and it costs $4.50 per square yard, while Trinidad asphalt is laid there with a 15 year guarantee for $3.50, a saving of almost 30%.

The statement of "Experience" that "In America, from New York to Denver, asphalt is giving way before the more enduring stone," can hardly be accounted for except on the ground that "Experience" does not know as much about this subject as his cognomen would indicate, as quite the contrary result is taking place, from New York to Denver. I need but mention the case of New York city itself to prove my contention. During the last five years New York has taken up over 100 different streets that were paved with granite blocks, some of them in fairly good condition, and has used the blocks for a foundation for asphalt. New York had five years ago more granite paved streets than any two cities in America, but they are getting rid of them with all possible speed. This year alone they are putting down about 30 miles of asphalt pavement, about one half of which will be put down on top of granite blocks. Fifth Avenue was paved with granite 12 years ago, and a contract was let last fall to replace it with asphalt, as the blocks were worn into cobble stones. The asphalt is laid under a 15 year guarantee, and as this is probably the heaviest travelled street in America, it looks as if good asphalt is enduring enough for most people.

Col. E. P. North, the Chief Engineer of New York, says that the difference between the price of granite blocks and asphalt is altogether in favor of asphalt, as with a 15 year guarantee it is much cheaper, and, in his opinion, a much better road than granite as it does away with a great deal of the noise which is such a serious factor in Gotham.

Experience with asphalt in Toronto should teach us that for track construction, such as we have, asphalt is not a success on account of the slight foundation under the ties; the heavy cars shake the pavement loose, causing it to break up and disentegrate.

The tracks should, in the writer's opinion, be repaved with granite blocks between the rails, and, if sides of street are not asphalted, brick should be put in the devil strip, where there is no travel, to accommodate the bicycle traffic, which must now be considered.

Time will show that brick is a fad similar to cedar block, with the exception that brick will not rot, and will last until it is worn out, while the blocks rot as quickly without travel as with it. Brick at the end of three or four years is as noisy as a granite block pavement, and under heavy travel, such as on Yonge street, would not last five years.

Why does "Experience" go away off to Berlin to try to show asphalt paving inferior to granite. It smacks of the brick men referring to what bricks did for Egypt. These cities are both a long way off! Right at home we have Bay street, laid with asphalt nine years ago, and right off it on Wellington is a piece of stone pavement for comparison. Jarvis and Sherbourne streets have been asphalted eight years, and the writer has seen no reports of officers being stuck in their deceitful crusts, but then there are asphalt pavements, and asphalt pavements here, as well as in Berlin.

W. G. MACKENDRICK.

Toronto, June 10th, 1897.

The Globe Furniture Co., of Walkerville, report good business prospects, having several large contracts for church and school seats and desks.

THE ROYAL CANADIAN ACADEMY.

A BRIEF outline of the history of the Royal Canadian Academy of Arts, of which a number of Canadian architects are members, will doubtless be of interest to our readers.

The Society was founded by the Marquis of Lorne in 1879, and held its first meeting in Ottawa on the 6th of March, 1880. The first exhibition was on the same date, opened by His Excellency the Governor-General. The title "Royal Canadian" was conferred by Her Majesty, 22nd June, 1880.

The objects of the Academy are: 1st, the institution of a National Gallery at Ottawa; 2nd, the holding of exhibitions in the principal cities of the Dominion; 3rd, the establishment of a School of Art and Design.

The first president was Mr. L. R. O'Brien, of Toronto. Since the formation of the Academy 18 exhibitions have been held—one in Halifax, one in St. John, and the others alternately in Ottawa, Montreal and Toronto. The Academy has contributed the paintings and sculpture in the National Gallery, Ottawa, and donates $500 annually for the support of drawing classes from the living model in Toronto, Montreal and Ottawa.

Her Royal Highness the Princess Louise took a lively interest in the formation of this society.

CONDITIONS OF ARCHITECTURAL COMPETITIONS.

A MAJORITY of the leading architects of New York have agreed that they will only take part in architectural competitions on the following conditions:—

That in any case the undersigned shall be paid at least a sufficient sum to reimburse them for their cash outlay in preparing their competition drawings.

That in case of limited competition the number of the competitors shall be definitely named and that the number shall not be increased without the consent of all competitors.

That it shall be definitely understood that the ordinary fees as published by the American Institute of Architects shall be paid as compensation for his professional services to the successful competitor.

That in work of any serious importance a professional advisor or advisors shall be appointed to act with the party instituting the competition in the preparation of a proper programme, which shall be definite in its statement of the drawings required, and their character, and of the various rules which shall govern the competition.

In the opinion of the undersigned it is very desirable that the professional advisor or advisors should be practicing architects; and the undersigned suggest that the best result can be gained by first appointing the architects to compete and by inviting them to meet with the party instituting the competition, for the purpose of consultation with regard to the preparation of the programme of competition, and to nominate the professional advisor or advisors.

It shall be the duty of the professional advisor or advisors to examine all drawings submitted by the competitors, and to place out of competition any competitor who has not submitted his designs at the date fixed for their reception, or who presents details or models which are not called for, or whose drawings do not conform exactly in number and character with the requirements of the programme, and that if placed out of competition his plans shall receive no further consideration by the party instituting the competition.

Inasmuch as the object of a competition is to adopt the general motif of a design to be further elaborated, and to select an architect for the work rather than secure plans perfectly studied in all of their details, the undersigned will enter upon no competition unless it shall be agreed that an award shall be made and that an architect shall be appointed on the consideration of the relative merits of the several schemes as shown by the drawings submitted, and that no demand shall be made for additional drawings or for a new competition.

The undersigned are of the opinion that all designs should be signed by their authors, and also that it is desirable that each competitor who has qualified by having his designs accepted by the professional advisor or advisors as complying with the terms of the competition, shall have an opportunity to personally explain his design to the party instituting the competition, in the presence of the professional advisor or advisors.

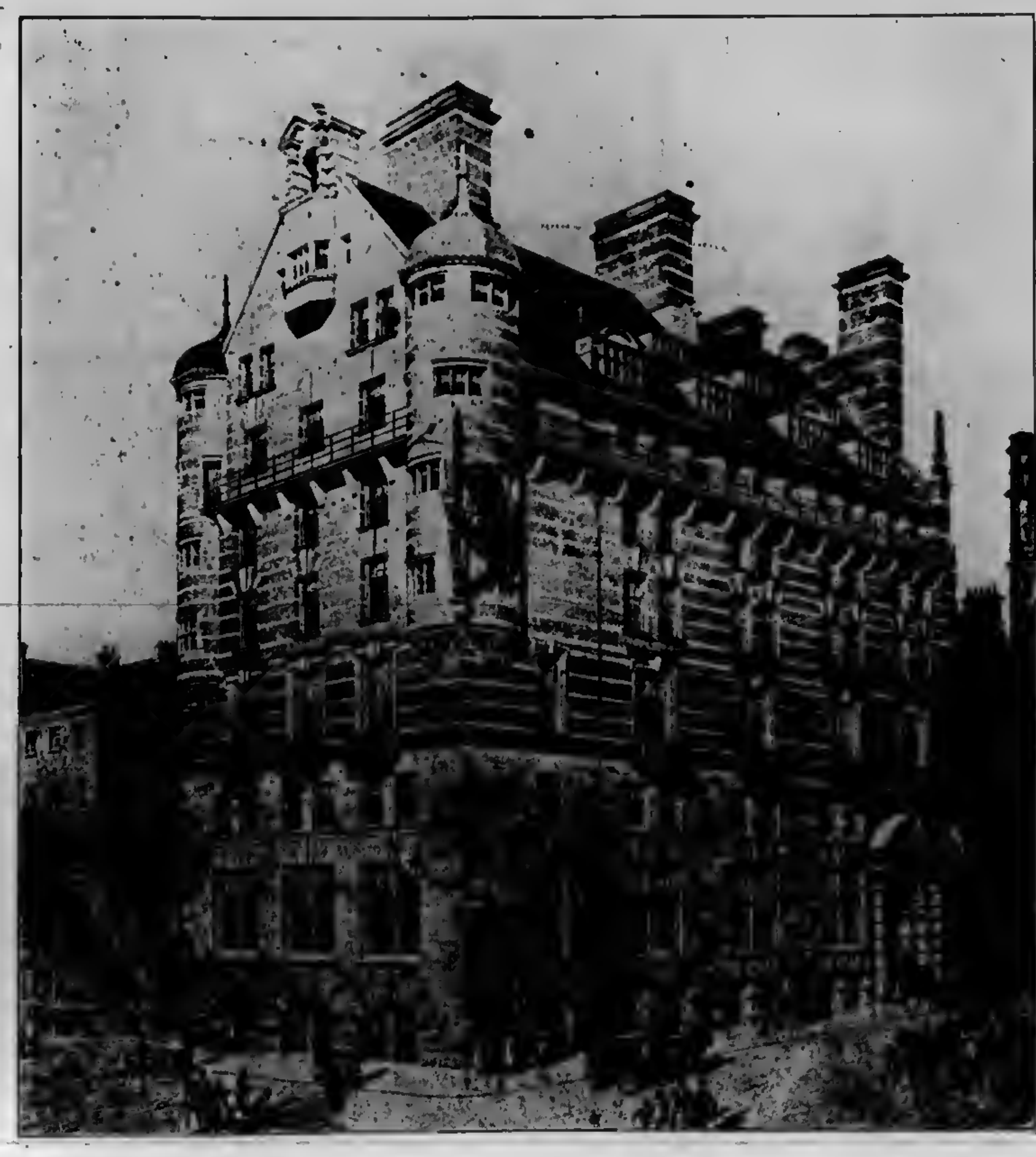
MANUFACTURES AND MATERIALS

CANADIAN HEATING APPARATUS IN EUROPE.

REFERENCE was made recently in these columns to the perfection to which heating apparatus and methods have been brought in Canada of late years. It is gratifying to Canadians to know that the good qualities of Canadian manufactured goods in this line are finding appreciation abroad as well as at home. In this connection we print on this page an illustration of the White Star Steamship Company's new office building in Liverpool, which is heated with Oxford Duet radiators manufactured by the Gurney Foundry Co., Toronto.

ASBESTOS AND ASBESTIC.

AT a recent meeting of the society of Arts, of London, Eng., a paper was read by Mr. R. H. Jones entitled "Asbestos and Asbestic," in which allusion was made to the recent discovery of asbestic at Danville, Quebec. Mr. Jones defined for his hearers the difference between the two materials. The name "asbestic" is applied to a purely fibrous material which forms the residue after the richer veins of asbestos have been extracted from the serpentine rock. It is used for a variety of purposes in the building trades, being capable of being pulverized and being converted into fire-proof cement or plaster. This material is a non-conductor of heat and sound, and being elastic will adhere to metal or glass. Asbestic paper, which is another product of this material, will in future be a competitor of paper made from wood and straw pulp for building purposes.



THE WHITE STAR S. S. CO.'S NEW BUILDING, LIVERPOOL, ENG.

AN IMPORTANT CHANGE.

AN important change has occurred in the old firm of Jos. McCausland & Son, stained glass workers and decorators, Toronto. Mr. Robert McCausland, who for many years conducted the memorial and art glass departments of the business, has withdrawn from the firm and will continue these branches at 87 King St. West, under the name of The Robert McCausland Stained Glass Company, Limited. The office, showrooms and works are uncommonly well arranged. Mr. McCausland, who is an experienced designer for glass, has equipped the new firm with improved materials and appliances to aid in producing the best possible results. The company has already been favored with several important commissions, among them the following: Memorial window, Chapel of St. John the Divine, Toronto; numerous windows for the Foresters' Temple; large classic figure window for the Department of Education, Toronto; memorial window, First Congregational Church, Kingston; decorative glass, Bank of Montreal, Newfoundland; three-light memorial window for St. Patrick's Church, Hamilton; memorial windows for St. Paul's Church, Charlottetown, P. E. I., and Yarmouth, N. S., besides several minor works.

CRUSHING STRENGTH OF WHITE PINE.*

BY A. H. HARKNESS, Grad. S. P. S.

THE tests, the results of which are given in the following tables, though not extensive enough to permit of any very definite conclusions being drawn, may prove of interest as serving to show the relative crushing strength of pine transversely and longitudinally placed, that is, with the load applied to the sides of the fibres, and with the load applied to the ends; also the the effects of moisture on the longitudinal crushing strength.

The specimens used in the tests were cut from pieces of white pine about three and three-quarter inches square, and are from the heart wood of small trees. Although they were not all cut from the one piece, the material in them was so similar in quality that the different tests will admit of comparison.

The pieces from which the specimens were taken were purchased from a city lumber firm 21st October, 1896, and represent fairly well the average quality of pine from which 4 x 4 inch pine is cut. They were stored in the laboratory of the school of Practical Science, until the tests were made.

The first table gives the transverse crushing strength tested on March 17th, 1897. The specimens were all cut in four-inch lengths from one piece, the specific gravity of which was 37.25, and which contained 12.2 per cent. of moisture calculated on the weight after being dried. This is about the normal amount of water contained in thoroughly seasoned wood protected from the weather. The loads required to produce a compression of three per cent. and of fifteen per cent. respectively, are given in table No. 1 in the fourth and fifth columns. The second column gives the thickness of the block, and the third the dimensions of the area subjected to pressure. Figs. (a), (b) and (c) show the different ways in which the blocks were placed in the machine in regard to the position of the heart of the wood and the annual rings. The letters in the sixth column refer to these figures.

* Paper read before the Engineering Society of the School of Practical Science, Toronto, and reprinted from the copyrighted report by permission of the Society.

The maximum strength of the wood is sometimes reached before the block is compressed fifteen per cent. In fact the load begins to increase very slowly shortly after the three per cent. limit is reached, at perhaps about five per cent. compression. When the pieces are placed as in Fig. (a) the maximum load is always reached at a compression of less than fifteen per cent., the annual rings seeming to act somewhat like curved plates, the rings splitting apart and the side towards which they are convex bulging out, as shown in Fig. (d). When the blocks are placed as in Fig. (b), the rings simply become pressed closer together, and the load will continue to increase indefinitely. Failure is accompanied by splitting above the heart, which seems to act as a wedge, as shown in Fig (d.) When the heart is near the centre failure is accompanied by both splitting above and below the heart, and bulging out at the sides as in Fig. (f).

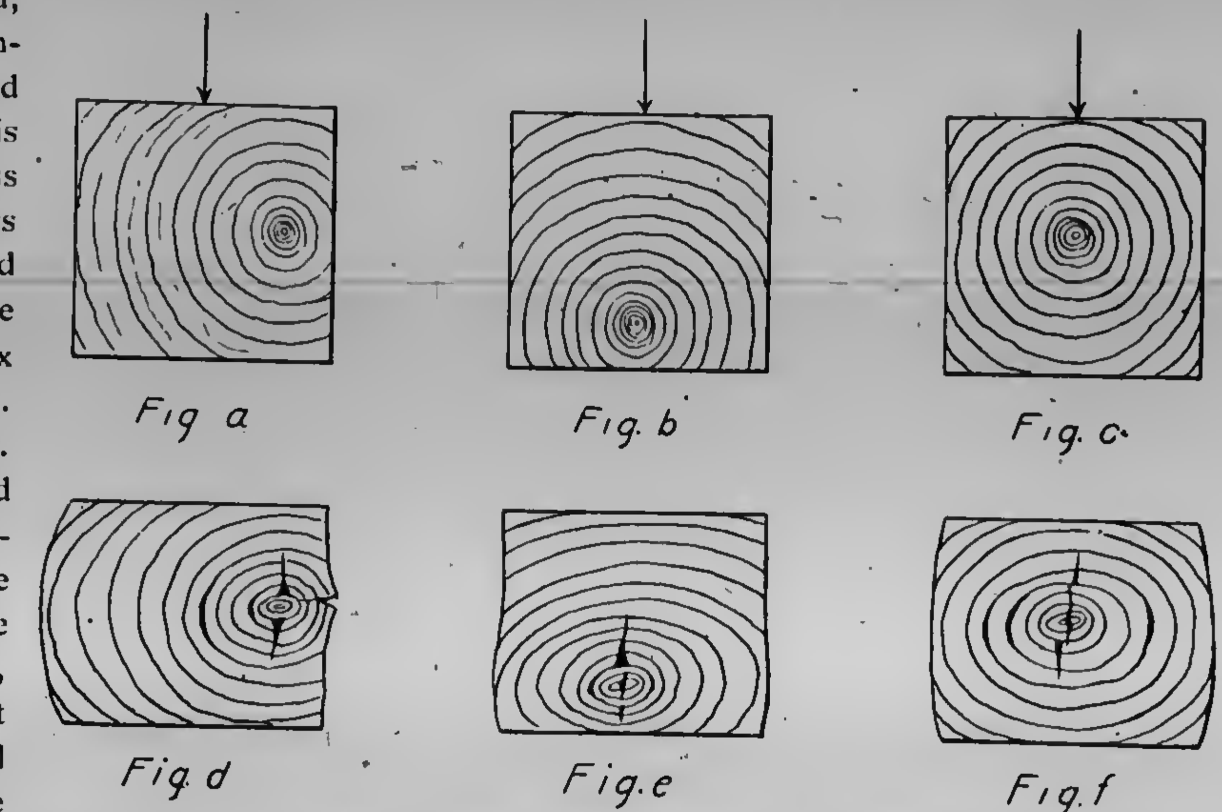


Fig a Fig. b Fig. c Fig d Fig. e Fig. f

TABLE NO. 1.

No. of Test.	Thickness in inches	Breadth in in. by Length in in.	Load at 3% Compression in lbs. per sq. in.	Load at 15% Compression in lbs. per sq. in.	Manner of placing block.	Remarks.
1	3.73	3.75 x 3.97	435	524	A	
2	3.73	3.75 x 4.00	475	478	A	
3	3.73	3.75 x 4.00	556	579	A	
4	3.72	3.73 x 4.00	468	576	B	
5	3.73	3.70 x 4.00	537	645	C	
6	3.73	3.73 x 4.00	483	576	C	
7	3.74	3.74 x 3.98	455	551	A	Knotty and splintery.
8	3.73	3.73 x 3.98	499	613	C	
9	3.73	3.74 x 4.00	408	482	C	A pitch ring about heart.
10	3.72	3.72 x 4.02	516	618	C	
11	3.72	3.73 x 4.02	493	593	C	Large season crack.
12	3.73	3.75 x 4.03	458	510	C	Knotty and pitchy.
13	3.74	3.71 x 4.02	505	584	C	
14	3.73	3.74 x 4.00	406	475	B	Pitch ring.
15	3.75	3.75 x 4.05	486	486	A	Knot at each end.
16	3.74	3.77 x 4.02	538	638	C	Season cracks.
17	3.73	3.70 x 3.96	420	542	C	
18	3.73	3.72 x 4.00	435	555	A	
19	3.72	3.73 x 4.06	542	621	C	
20	3.73	3.73 x 4.02	413	413	B	
21	3.73	3.71 x 3.95	534	551	C	Gummy.
22	3.74	3.74 x 4.00	441	541	A	Gummy and shaky.
23	3.73	3.75 x 4.00	437	513	C	Pitch ring.
24	3.72	3.72 x 4.02	543	597	B	An enclosed knot.
25	3.72	3.74 x 4.02	440	563	C	
26	3.74	3.70 x 4.00	550	596	C	
27	3.73	3.70 x 6.00	489	600	C	
		Average	480	560		

TABLE NO. 2.

No.	Crushing strength per square inch.			
	A	B	C	D
1	5,110	3,641	3,598	3,513
2	4,746	3,982	3,562	2,948
3	4,848	4,391	4,078	3,043
4	5,317	4,096*	3,740*	3,332
5	4,934	3,883*	3,826*	3,947
6	5,050	4,426*		3,115
Average	5,001	4,069	3,761	3,316

Table No 2. shows the longitudinal crushing strength. The specimens were cut in eight inch lengths with the exception of the five marked with asterisks, which were each four inches long.

Those of which the crushing strengths are given in column A, were cut from the same stick as the four-inch pieces tested transversely, and were tested at the same time, March 17th, 1897. Those given in columns B, C and D were tested on December 21st, 1896, and were cut from the ends of three different sticks, which had been tested as long posts on December 16th, on which date the specific gravities and percentages of moisture were as given in the following table. As the pieces would have lost some moisture in the five intervening days, the values given for B, C and D are higher than the actual.

	A	B	C	D
Specific gravities......	37.25	51	46	53
Percentage of moisture	12.2	23		22.5

The percentage of moisture in C was not determined, but was probably about the same as in B and D.

A comparison of the results given in table No. 1 with those in column A, table No. 2, both sets of tests being made on specimens from the same piece of timber, shows that for well seasoned pine the longitudinal crushing strength is about ten times as great as the transverse strength to resist a compression of three per cent. Hence it is quite evident that in the case of a wooden column in order to develop its total crushing strength, it is necessary to have a capital to receive any wooden beams resting on it. The area of the top of the capital should be about ten times the area of the column, or the top of the capital should be over three times the diameter of the column on which it rests. The same thing applies to the cases of columns supported by timber placed horizontally. Of course in the case of long posts in which the full crushing strength of the cross section is not reached, the ratio between the area of the capital and the column need not be so great.

A comparison of column A in table No. 2 with the columns B, C and D, shows the very decided effect which the quantity of moisture in timber has on its crushing strength.

The Master Plumbers' Association of St. John, N. B., at their last meeting appointed delegates to attend the Toronto convention.

Mr. W. B. Lait, formerly with Mr. George Browne, architect, Winnipeg, has commenced the practice of his profession in that city on his own account.

Mr. George H. Proctor, of Sarnia, Ont., in renewing his subscription to the ARCHITECT AND BUILDER states that he is much pleased with the improvement recently made in the paper.

MODEL PLUMBING BY-LAW.

IN view of the advances which have been made in the art of plumbing during the past ten years, due to the increased knowledge of the physical and mechanical principles underlying the construction of sewers, house drains and house plumbing, the Provincial Board of Health has drawn up the following rules, which are suggested as applicable for adoption by those cities, towns and villages in Ontario which have not already a by-law of a similar character in force. Under the powers given in section 113 of the Public Health Act these rules may at any time be made a town by-law in place of the rules relating to plumbing which are contained in Schedule A of the Public Health Act. Whenever any municipality purposes to establish a system of public sewerage the Provincial Board has, as a condition of the approval of such system, adopted the rule of requiring that a plumbing by-law of a character similar to the following be adopted by the town council as a part of such sewerage system :

I.—1. No house drain or sewer shall be constructed or extended to connect with any private, common or public sewer ; nor shall any house plumbing be placed within any house until the plans and details of construction, and the qualities of materials used shall have been approved of by the Local Board of Health or such municipal officer or officers to whom said work is delegated by the Board.

2. The owner, or his agent, shall, before the commencement of construction of the drainage or plumbing of any house or building within the municipality, have sent for filing to the clerk of the municipality the plans and details of construction thereof, together with the necessary specifications of information as set forth in this by-law for examination and approval. Such plans shall be submitted to the town engineer and medical health officer, or to such officer of the municipality as may with their approval be delegated by the Local Board of Health for the purpose. The plans, when satisfactory, shall be approved of and a permit granted under the hand of the officer designated by the Local Board of Health, when the following conditions have been fulfilled :—

II. The plans and specifications submitted shall show :—

1. The location, depth and size of the house drain or sewer, and position of traps, cleaning screws and pipes, if such exist thereon.

2*. The location of soil pipe, and of all pipes within the walls of the house ; also their size, weight and kind, also the position and size of all traps and vents, and the location and kind of all closets sinks, baths or other fixtures connected therewith.

3. That the house drain must not in any case be less than 4 inches in diameter, and may in no instance exceed 6 inches, except by special permission of the properly constituted official or officials.

4. That the soil-pipe, drain or sewer within the house be of a minimum diameter of 4 inches, and the pipes connected directly therewith shall in every case be constructed of iron, either cast or wrought iron, or steel, and such as shall be approved of by the proper official as suitable for the work, and such soil-pipe shall extend to a point at least three feet outside the wall of the building, and there be properly connected with the house drain or sewer by proper bedding and jointing in Portland cement.

5. That any cast-iron pipe used shall have the specified minimum weights as below, and all fittings thereof shall correspond in weight and quality.

If 2 inches in diameter	....	5½	lbs.	per lineal foot.
" 3 " "	....	9¾	"	"
" 4 " "	....	13	"	"
" 5 " "	....	17	"	"
" 6 " "	....	20	"	"
" 7 " "	....	27	"	"
" 8 " "	....	33½	"	"

6. If wrought iron pipes be used the following shall be standard weights :—

WEIGHTS OF WROUGHT IRON PIPE.

1 inch	....	1.67	lbs.	per lineal foot.
1¼ "	....	2.24	"	"
1½ "	....	2.68	"	"
2 "	....	3.61	"	"
2½ inch	....	5.74	lbs.	per lineal foot.
3 "	....	7.54	"	"
3½ "	....	9.00	"	"
4 "	....	10.66	"	"
4½ "	....	12.34	"	"
5 "	....	14.50	"	"
6 "	....	18.76	"	"
7 "	....	23.27	"	"
8 "	....	28.18	"	"

*NOTE.—The vertical portion of the soil pipe should not be hung or fastened to any floor or wall, but should rest on a stone foundation at its foot, as any settlement or heaving of the floor or house is liable to pull joints apart.

7. That the vent pipes and other attachments of the soil pipe and fixtures may, if under 2 inches in diameter, be of lead, but if over 2 inches, they must be of iron. Such lead pipes shall have the specified minimum weights of—

If 1 inch in diameter	....	2	lbs.	per lineal foot
" 1¼ " "	....	2½	"	"
" 1½ " "	....	2¾	"	"
" 2 " "	....	3½	"	"
" 2½ " "	....	5⅓	"	"
" 3 " "	....	7¼	"	"
" 4 " "	....	8	"	"

8. That the wrought iron pipes shall have screwed cast iron fittings ; that all joints in cast iron pipes shall be caulked with tow and molten lead, properly bedded and hammered ; that joints between iron and lead pipes be made with brass thimbles or ferrules of same size as lead pipe, and properly wiped and soldered to it, and properly gasketed, loaded and caulked to said pipe.

9. That sinks, wash-trays and closets are designated as to quality ; wooden or other absorbent materials for fixtures must not be used inside of houses, and approved strainers and grease traps must be provided for in those fixtures requiring them, or on such as the proper official may direct.

10. That the plans show location and arrangement of all pipes which must be as direct and as accessible as possible, and on inner walls when danger from frost exists.

11. That the soil pipe and attachments have a minimum fall of one inch in every four feet towards the outlet ; shall open freely above the house without a hood, and be one inch larger in diameter above the roof than inside.

12. That all vent pipes passing through the roof, have a minimum diameter of 3 inches, and are in no part of the system less than 1¼ inches internal diameter.

13. That every waste pipe from any fixture be shown connecting with the main soil pipe, and in no case with the trap of a water-closet or any other fixture, and must in no case be less than 2 inches in diameter.

14. That every water-closet, urinal, bath, sink, wash tray and tub or set of tubs, be shown separately trapped as near the fixture as possible ; and that overflow pipes from any fixture, connect with the fixture pipe, on the proximal or fixture side of the trap.

15. That every trap or fixture be shown to have its vent pipe to prevent siphonage, except where some anti-siphon attachment, approved of by the proper official, be shown. The vent pipes from several fixtures may be shown connected with one outlet vent pipe of proportionately larger size, or with the soil-pipe above the highest fixture.

16. That the overflow pipe from the water-closet supply tank be led into the water-closet basin, bath-tub or sink, but in no case be connected with the soil-pipe.

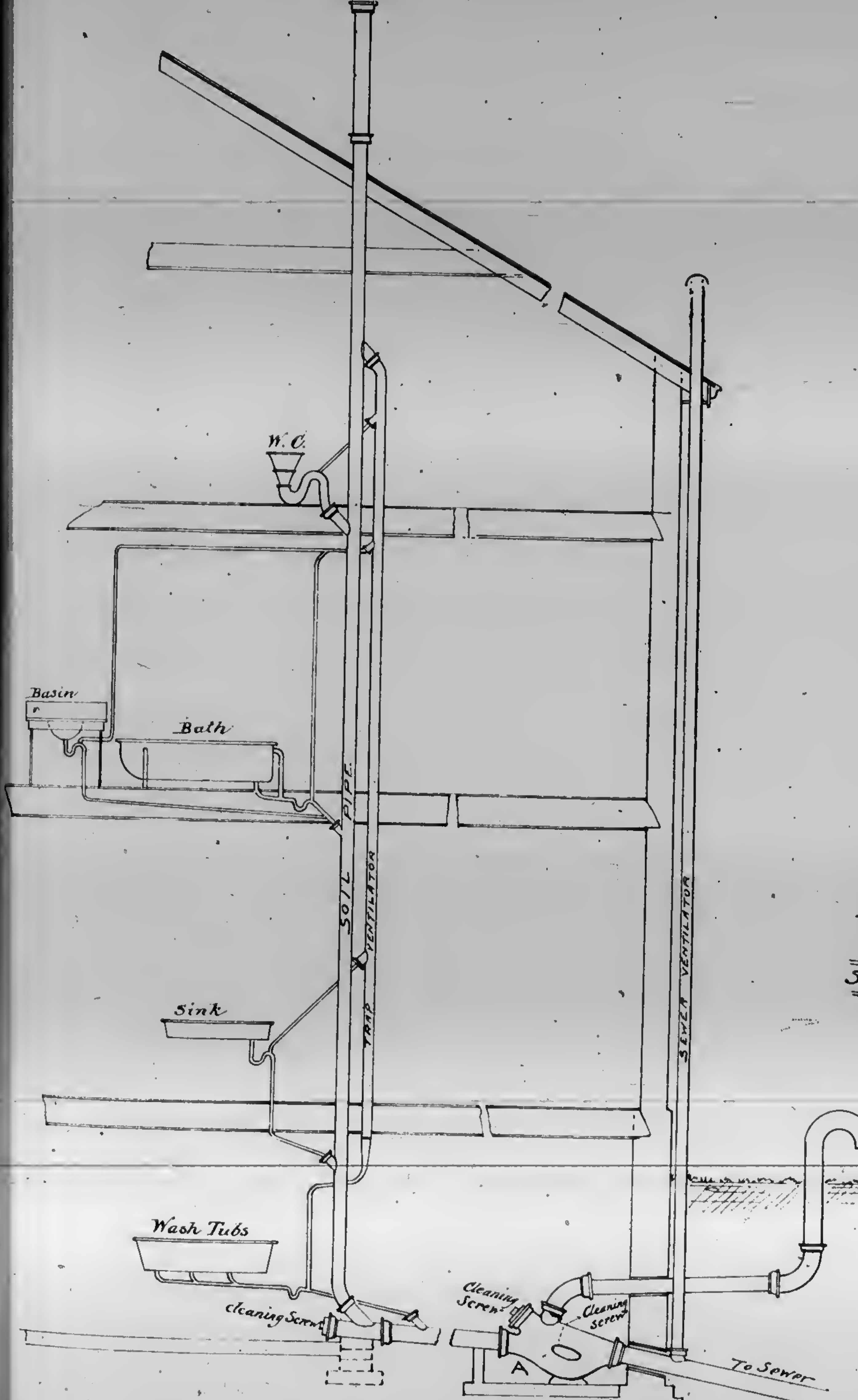
17. That the plans locate water-closets in rooms where light and ventilation are provided for ; and that no water-closet be located in a cellar, except where specially permitted by the proper official with special provision for lighting and ventilation.

III. The following rules shall be the guide for contractors and inspectors :—

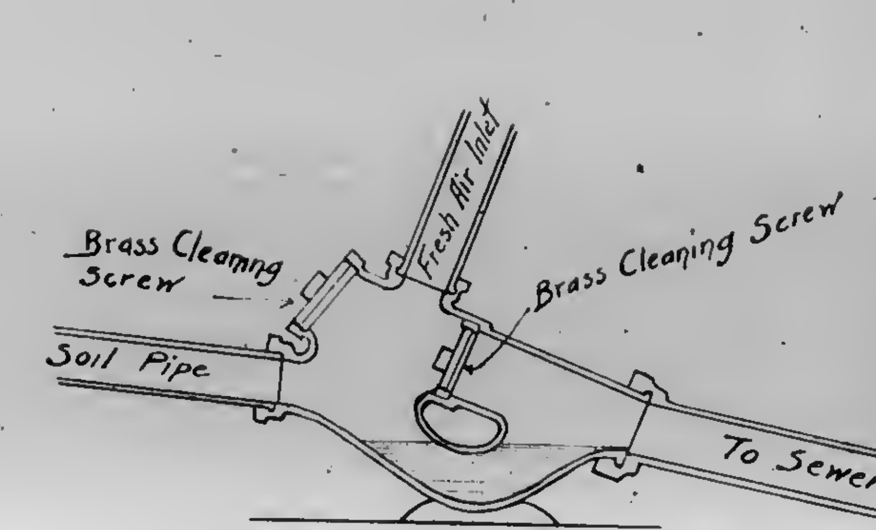
1. The house-drain or sewer must be laid on an even grade and in straight lines from the house to the street connection ; and where soil is newly made or of a loose character, the drain must be laid on well rammed clay, concrete or board bottom, and must have a grade not less than one inch in four feet, and so that the inner suface shall be left smooth, clean and of even grade through its entire length. All joints in the house-drain must be cemented with Portland cement.

2. The walls of houses must, wherever possible, be drained by field tiles, not less than two inches in diameter, laid around and outside the foundation walls, at a depth of at least 6 inches below the same, and on a grade of at least one inch in eight feet. Such tiles must be led directly to a system of tiles laid alongside the house drain and street sewer for sub-soil and cellar drainage, and if not then must connect with the house sewer with provision made for trapping the same, and keeping trap sealed automatically with water.

3. Where no special provision is made for ventilating street



SECTION SHEWING GENERAL ARRANGEMENT OF HOUSE PLUMBING AND DRAINAGE



Section of Trap for Inclined Soil Pipe, A.

sewers, and unless the town system provides for no traps on house sewers, the house sewer, if trapped outside the house wall, should be provided with a separate cast or wrought iron ventilating pipe of quality to be approved of by the proper official, of not less than (4") four inches in diameter, carried to a point above the roof of the house and subject to the conditions as to height the same as the soil-pipe and other vent pipes.

4. Where there is a trap on the house drain, it shall be laid or covered so as to avoid the danger of frost, preferably within the house wall. The soil-pipe may have a fresh air pipe entering it on the proximal or house side, and leading to the fresh air with opened end turned down, and at a height above the danger of snow or other obstruction. Under certain circumstances the local authority may require this pipe to extend above the roof of the house.

5. The house drain or soil-pipe where it passes through the wall must be supported on concrete, stone or brick, to prevent settlement, and similarly be protected or linteled over with stone or brick, to prevent its being broken by settlement of the wall, and in its course to the vertical pipe must be supported on piers or by iron hooks fastened to the cellar walls, or by strong supports suspended from the joists above, if latter are of proper strength, and be laid throughout on an even grade.

6. In all cases, where possible, the soil-pipe should be accessible, and easy of inspection by at least one brass cleaning screw near the foot of vertical pipe, and one immediately within the trap at the outer wall. In any case where the house drain must be laid below the cellar floor, it must in no case be covered with concrete or earth, but be laid in a passage made of brick or concrete with a cover readily moveable at all times.

7. Safes below closets, urinals, basin and refrigerators must not be connected with any soil pipe, waste pipe, or sewer, but must open above a trapped sink or basin, or into the pipe supplied for cellar and sub-soil drainage.

8. Before the plumbing fixtures are connected with any system of house drains they must first be tested by sealing all openings below the top of the soil-pipe, and applying the water test by filling the pipe to the top; and examining carefully the pipe throughout the length for leaks. All defective pipes must be removed and replaced by new ones, aod re-tested. A final smoke test must be ordered at the direction of the proper official.

9. Old plumbing and drainage work which may be found on inspection defective, must have such alterations made as the officers in charge of the inspection may direct.

RECENT AGITATION FOR A DUTY ON GYPSUM.

While the United States tariff bill, which is now before the Senate was being framed, steps were taken by the western producers of gypsum, or plaster rock, to secure the imposition of a duty on importations of that article from Canada. Plaster manufacturers along the Atlantic seaboard are dependent almost entirely upon Canadian gypsum for their raw material, and consequently met this proposal with strong opposition, claiming that it would increase the cost to the consumer for the benefit of the railroads and mine owners.

The advocates of the duty claimed that the Americans were compelled to relinquish a large amount of trade and employment that properly belonged to their own people, and that four-fifths of the labour involved in the production of plaster is in quarrying it and preparing it for the mill. It is further claimed that the men employed in the gypsum quarries in the Maritime provinces are paid less wages than those thus engaged in the Western States, and that there is an adequate quantity of gypsum in the Unites States to supply all the demands of that country for many years to come. The output during 1895 was 265,000 short tons. It was asked that a duty of at least $2 per short ton be placed on the crude rock, $2.50 on ground gypsum and $3 on calcined plaster, or plaster of paris.

Against these arguments the plaster manufacturers in the Eastern States pointed out that only about one-fifth of the cost of producing plaster could be charged to quarrying, that the eastern mills using Canadian rock were subjected to heavy freight charges, most of which is paid out to American seamen and vessel owners engaged in the coast wise trade, while the western producers had the raw material at their doors, and that it would result in the formation of a combine. It is claimed that the product of the eastern manufacturers does not come in competition with that of western manufacturers. There has never been a quality of gypsum rock discovered so far in the United States that will produce a quality of plaster equal to that made from the Nova Scotia and New Brunswick rock, and the principle use for eastern plaster in the west has been for ornamental work and in the potteries, it having been found impossible to use western plaster for these purposes.

A large proportion of the Canadian plaster rock imported is sold ex vessel to small mills which simply grind it and ship it to farmers in the interior. This is particularly the case at southern ports, and consequently any increase in the cost of the rock would be a burden upon the agricultural interests of the United States.

The importance of the trade of the Maritime provinces of Canada in gypsum rock to American coasting vessels is very great, as it affords freight for return trips. A very large proportion of this business is carried in American bottoms, the vessels engaged taking return cargoes of manufactured plaster and general merchandise to other American ports on their way back to obtain cargoes of gypsum. If no return gypsum cargoes were obtainable the coasting trade would be very seriously affected, as would also the welfare of the seamen engaged in this branch of commerce.

Some idea of the importance of this trade may be obtained from the fact that one Canadian firm alone shipped last year 60,000 tons, two-thirds of which was carried by American vessels. This point has been strongly set forth in the representations to Congress, and a feeling antagonistic to the duty has been aroused which is almost certain to prevent its imposition.

DEMAND FOR BUILDING MATERIALS IN AUSTRALIA.

Mr. J. S. Larke, in his last report to the Dominion government, states that there is an opening in Australia for roofing slates. He says: The improvement in business is leading to a revival in building and an increase in the demands for roofing slates. The largest portion now comes from Vermont via New York. Formerly Welsh slate held the market. I have written to the Quebec slate companies whether they cannot share in the trade. I presume their slate is equal to the Vermont, and with an enlarged demand they would be warranted to adopt appliances for cheaper production. It is probable that to give best freight rates it would be necessary to ship by sailing vessel from Montreal. There is a very fine slate quarry, well fitted for exportation, in British Columbia. It ought to be in a position to command this trade, but unfortunately it is not being worked, so I am informed. The demand here would warrant the working of a quarry on an extensive scale. Plaster of Paris is another building material for which there is a better demand. The trade is now supplied from New York and Maine, but Nova Scotia and New Brunswick should be able to take part in it.

STUDENTS' DEPARTMENT.

O. A. A. EXAMINATIONS.

The examinations of the Ontario Association of Architects, for the year 1898, are announced to take place at the School of Practical Science, Toronto, on March 14th, 1898. The requirements for admission will be the same as in former years.

Candidates must send their names to the Registrar at least one month previous to the date of examinations, and in the case of those presenting themselves for the first time, a certificate of status with reference to the requirements for admission.

The percentage of marks required to pass will be 45 per cent. for the following subjects: Foundations, Structural Iron Work, Strength of Materials, Nature and Properties of Materials, Practical Knowledge of Building Trades, Sanitary Science, Elements of Construction.

For the following subjects the percentage required to pass will be 30 per cent.:—Architectural Jurisprudence, Design, Technical Terms, History of Architecture, Mouldings, Features and Ornaments, Heating and Ventilation, Euclid, Algebra, Statics, Trigonometry.

No supplemental examioation will be allowed to candidates for the final examination. Candidates for the first and second intermediate examinations will be allowed a supplemental examination in one subject.

The fee for each examination is ten dollars, and for each supplemental examination two dollars.

FIRST EXAMINATION.

Each candidate for the first examination must, at least one week prior to the date fixed for the examination, send to the registrar the following drawings, which must be certified by his principal to be his own work:

Five sheets of drawings, one of each of the Roman orders; one sheet of the mouldings and ornaments of these orders drawn to a larger scale. (Each sheet to be of the size of a half sheet of Whatman's Double Elephant Paper, i.e., 20 in. by 26 in.)

The subjects for examination will be:

Elements of Construction.—Text book: Mitchell's Building Construction.

Mathematics.—Euclid: Books I, II and III. Plane Trigonometry: Including the solution of plane triangles. Algebra: Including quadratic equations.

Technical Terms.—A knowledge of the terms necessary to understand the description of a monumental building and its parts.

History of Architecture.—To the close of the Roman period. Books recommended: Stevenson's House Architecture Vol I, as an introduction; Banister Fletcher's History of Architecture; Fergusson's History of Architecture; Statham's Architecture for General Readers.

SECOND EXAMINATION.

Every candidate for the second examination must, at least one week prior to the date fixed for the examination, send to the registrar the following drawings, which must be certified by his principal to be his own work:

One sheet of Romanesque architecture; two sheets of Gothic architecture; one sheet of drawings measured from existing examples; one sheet of constructional details. (Each sheet to be of the size of a half sheet of Whatman's Double Elephant Paper, i. e., 20 in. by 26 in.)

The subjects for examination will be:

Statics, Graphical and Analytical.

Strength of Materials.—Textbook for both the above neads: Lessons in Applied Mechanics, by Cotterill & Slade; Part II.

Practical Knowledge of Building Trades.—Masonry (excluding cut stone work), Brickwork and Plaster. Text books: Kidder's Building Construction and Superintendence. Clark's Building Superintendence.

Structural Iron Work.—The candidate will be required to draw details of the forms of iron construction in use in ordinary practice, viz.: the construction of columns and girders, and the framing of beams and trusses. Text books: Mitchell's Building Construction. Advanced course. Kidder's Architects' and Builder's Pocket Book.

History of Architecture.—From the close of the Roman period to the present time. Texts books recommended: Fergusson's History of Architecture; Banister Fletcher's History of Architecture; Parker's Introduction to Gothic Architecture; Statham's Architecture for General Readers.

FINAL EXAMINATION.

Every candidate must, at least one week prior to the date fixed for the examination, send to the Registrar a perspective drawing which must be certified to be his own work. Drawings to be on a sheet of paper, 20 in. by 26 in., and not mounted on cardboard.

The subjects for final examinations will be:

History of Architecture.—The candidate will be expected to know the history of the development of Architecture.

Mouldings, Features and Ornaments.—The candidate must be able to draw the characteristic mouldings, features and ornaments of any style.

Design.—As illustrated by drawings for a building of moderate dimensions, or a portion of a building, from particulars given, with details of construction and ornament. In addition to the study of architectural style, which will be necessary for this examination, Osborne's House Planning should be read. (The aspect compass in this book is incorrectly subdivided.)

Nature and Properties of Materials.—Limes, cements, stones, bricks, timber. Text book: South Kensington Notes on Building Construction.

Foundations.—Text hook: Kidder's Building Construction and Superintendence.

Architectural Jurisprudence.—Text book: The Law Relating to Civil Engineers, Architects and Contractors, by Macassey & Strahan.

Practical Knowledge of Building Trades.—Sufficient for the purposes of ordinary building. Text books: Kidder's Building Construction and Superintendence; Building Superintendence, by T. M. Clark.

Strength of Materials.—Designing structures of an ordinary kind from data, with computation of the strains involved.

Heating and Ventilation.—Text books: Ventilation and Heating, by John S. Billings; Steam Heating for Buildings, by Wm. J. Baldwin.

Sanitary Science.—Text books: Gerhard's House Drainage; Bayles' House Drainage and Water Supply.

Steel and Iron Construction and Protection in Buildings.—Text book recommended: Skeleton Construction in Buildings, by W. H. Birkmire.

A WORD ABOUT SKETCHING.

"If any apology is needed," says Mr. John A. Begg, in Architectural Association Notes, "for laying the birch on the back of a much-thrashed subject (but what subject is not much thrashed?), it is but this. A change seems to have crept into the way of students, and the time has come when a word about sketching may be said in the light of such change.

It is not that we are sketching much more or less, not that we are sketching better or worse (though I think we are sketching better), but that there is a tendency to split sketchers, elder as well as younger, into opposite camps.

These camps are pretty well defined, and it is plain to be seen they are opposing camps, having little in common, for seldom is a member of the one a member also of the other; and when a man changes camps—as does happen—he usually renounces entirely his former ways. The two are plainly at cross purposes—they appear to do their sketching for different reasons, and from different principles that seem to lie at the root of their whole conception of the architect's function.

Look at them. On the one hand, there are those to whom our improved—or should I say cheapened?—methods of reproduction are a banner to rally round, and on the other, those who go forth to war armed with a two-foot rule and accoutred with a big note-book—or rather who go a-hunting (pot-hunting is it called?) with

the rule for their gun and the note-book for their game-bag.

We believe (say the first) in training hand and eye, and in sketching as the best means to that end. In the study of mass, effect, essentials and in schooling ourselves to take a large view of things. We believe, moreover, in precedent, in so far only as it stimulates but does not fetter us in the designing of original work.

We believe (say the second) in drawing only as a means of study. In exact and careful study of details first and through these afterwards of mass. In drawing what will be most useful to us in our practice, and that in such a form as will be most handy for reference. We believe in upholding tradition, that new tradition may have legitimate birth.

Each of these seems so reasonable that one is inclined to ask, "Why all this pother? What is there in either that is antagonistic to the other? Why not mingle banners and join forces, and so march shoulder to shoulder? Why, indeed! Yet the points of difference are quickly shown by what each think of the others.

The first hold that the trained eye will ever guide the trained hand aright in the tracing of true proportions and fitting forms, even down to the minutest details in original design, and cry out upon the second for a slavish adherence to traditional detail, taunting them with utter helplessness when away from their note-books. The second retort that their rivals' method of study get them no knowledge of architecture, but only of drawing, and hold up their own well-filled note-books as but a type of their well-stored minds. Put mind into your work, say the first—beauty, say the second.

To an unprejudiced eye (that is one which looks for faults in each), broadly, the first school oftenest seems to fail in beauty of detail—just as you might expect—and the second in largeness of idea. It would not do to quote instances, nor is it necessary, for they are easy to recognize and will readily suggest themselves. It is true that we must all have our failings, but should we not try to counteract them?—and there would be nothing to be said if our men of large ideas were found sketching a little more than they do for the sake of detail; and vice versa our cunning inventors of beautiful detail sketching more for the sake of receiving impressions.

The latter, on the whole, have just now, I think, the louder voice and the larger following. The louder voice because matured generally by years, and settled into a commanding basso that rings of authority and circumstance; and it might ring and welcome but that it is apt to find too ready an echo from voices that have not lost their youthful treble.

It is surely impossible for a man who claims to have a sense of justice to argue himself to a conclusion in favor of either of these two methods. There is so much to say for each. It is just conceivable that those who have begun life in one camp may find that as years have grown on them with gray hairs and light-and-air cases they have gradually moved over to the opposite camp there perhaps to stop. But from which and to which camp this migration is likely to have taken place I pray to be excused from saying. It would be hard to tell, and the more the question were looked at so the more it would be hard to tell.

It is just as likely, but for the fleeting fashion of the time, to have been the one as the other. Now, who of us old men are ever really ashamed of the follies of our youth? Or who of us young men but could (did we stop to think) look forward with some complacency to a total change of ideals when age shall have come upon us? If one camp may have been associated with our earlier and the other with our later years, who is to say which was wrong and which right? That one may have come last as a development from the other is surely no more an argument in favor of that one than that it may have come first, when the mind was pure, fresh and receptive, is an argument for the other.

Did we stop to think, that hits it, for old and young alike, for sketchers and measurers, for perspective men and collectors of detail, for impressionists and academics. Did we stop to think we might use the time we waste and the energy in inveighing against the opposite camp, to further the interests of our own. For both are serving under the same queen, and there is no reason why an exchange of civilities might not take the place of an exchange of invectives. A day's hunting as guest to one camp would come amiss to no member of the other. In golf, when you have become "stale" in the use of your "driver," you play for a day or two with your "cleek."

QUESTIONS AND ANSWERS.

A SUBSCRIBER at Chatham, Ont., writes: "Please inform me to whom should belong the responsibility for the care of stone after it is put in the building—the party who furnishes the stone, or the bricklayer. In the event of the stone getting chipped by bricks falling on it, or being splashed with mortar, who snould be held responsible?"

ANSWER.—The question of responsibility for the care of materials placed in a building is usually covered by a clause in the contracts, and in case the question arises as to where the responsibility for damage belongs, the matter is usually decided by the architect. Where a person enters into a contract to supply stone or any other material for a building, which is to be placed in position by other contractors, his responsibility ends when the material is laid down in good condition at the building. In case the contractor agrees to furnish the material and place it in position in the building, he is held responsible for its protection from damage until the completion of the building, and is expected to take all reasonable precautions to guard it from damage. If, after such precautions have been taken, it should be damaged through the negligence of a contractor for one of the other trades, we imagine that there can be no question that the person guilty of such negligence would be held accountable for whatever injury might result.

The McEachren Heating and Ventilating Company, of Galt, Ont., report an increasing demand for their improved dry kilns, having recently received orders from the following; Densmore & Crowe, Lower Stewicke, N. S.; J. and D. A. Harguail, Campbellton, N. B.; Dyment, Baker Lumber Co., London; Laking, Thomson, Patterson & Co., Hamilton; M. Brennen & Sons, Hamilton; Dowswell Bros., Ltd., Hamilton; Mechanics Manufacturing Co., Summerside, P. E. I., and J. and P. Nadeau, Grand Cascefedia, Que. It is claimed that these kilns will dry green elm, ash, whitewood, etc., in from six to eight days, of ten hours each, without checking, warping or case-hardening, using only exhaust steam. The McEachren Co. also make a full line of ventilating, shavings and electric fans, blowers, exhausters, etc.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Tin Roofs.

TIN roofs do not prove as satisfactory as they might do, owing in a great measure to the fact that they are not as honestly put on as they should be. A roof properly covered with the best quality of tin should make a first-class one for such buildings as have flat, or nearly flat roofs. Two styles of tin roofs are used, one is known as the "flat lock seam" and the other as the "standing double lock seam." The first is generally employed on roofs that are nearly flat. This is done by locking the sheets together on all four sides alike and soldering, thus making one sheet of the whole roof. In no case, however, should tin be put down in one unbroken flat; there should be cleats or buttons running lengthways under every seam that runs down the incline of the roof; this will provide for contraction and expansion. Where a flat roof has a fall of three-fourths of an inch to the foot or more, the standing double lock seam will make much the better roof. This style of seam may be made in several ways, but the better way is to lock the cross seams together in the workshop and properly solder them before rolling the sections up in rolls to convey to the roof. Use cleats about 1½" × 1½" and place same along every longitudinal joint, and lap the joint over in the centre of the cleat; nail with tinned nails and solder the joint its entire length. To make the roof more lasting it is good practice to paint the underside of it before laying down, with two coats of good oxide or graphite paint. The upper side of a tin roof should never be painted until the second year it has been in use. The tinsmiths, when laying on the tin, should wear rubber soled shoes, or shoes with some sort of soft soles, as leather soles having nails or pegs in them are sure to cause injury to the tin, either by crushing holes through, or making indentations that will hold wet or snow, and cause corrosion to take place at a much earlier period than would otherwise occur.

Air Space in Stables.

IT is stated on good authority that a horse or cow has six times the breathing capacity of a man, and it is known that the latter averages twenty inspirations a minute, each inspiration being of a volume equal to forty cubic inches, so that he requires 800 cubic inches of fresh air per minute to supply him with the necessary health-giving pabulum for his lungs. Each expiration unfits for breathing twice the bulk of fresh air; that is, the 800 cubic inches expired per minute contaminates 1,600 inches of fresh air, or nearly one cubic foot. In round figures then, a man requires one cubic foot of fresh air for every minute of his existence, or 60 cubic feet per hour. A cow or a horse will require 360 cubic feet of air per hour, or 3,600 cubic feet of space in the stable in order to keep the air in a healthy condition. A stable then, with stalls 6' 6" wide and 9' long, ten feet between floors, and a passage behind the animal of six feet, will provide ample air space for each horse or cow. There are many methods of ventilating stables, but the one that seems the most reasonable and effective is the ridge louvre or ventilator extending the whole length of the roof. This method of ventilation is adopted by military men in the construction of stables for artillery and cavalry horses. It is a good plan to leave vent holes near the eaves of the building, about 4 x 4 inches, sloping outwards with the line of the roof in order to keep the rush of air from going downwards. A small hole, about 2 x 2 inches, just above the stable floor, will allow enough air to satisfy each stall and aid in ventilating the stable. There should also be a small window to each stall—on the swing principle, and the glass should be of such a kind as will not let in the bright sun rays, as such would tend to injure the animal's eyesight. These conditions, properly followed, will produce a healthful stable for cow or horse.

Hardwood Finish.

COUNTRY builders who have always been accustomed to finishing their houses with pine or other soft woods, experience some difficulty in getting a proper estimate of the extra labor required to finish in hardwoods. It is safe to say that the cost of labor in finishing off a room in cherry, black birch or white ash, is about double what it would be if finished in white pine. Black ash or elm finish takes about 50 per cent more time to put in proper shape than pine, and oak, red or white, costs a trifle more to finish than cherry or black birch. Lumber cut from the butt logs of the black birch is one of our handsomest woods, and is strong and durable and will take a polish as high as the best cherry or mahogany. For newels, hand-rails and balusters, it is superior to walnut, and much stronger, works better in the lathe and is less apt to chip or sliver under the carver's tools. If not quartered when sawn, it has the fault of warping, and will be affected more or less by atmospheric changes, but on fixed work this may easily be prevented by proper fastenings, and in free work, such as doors, sashes, venetian blinds, etc., quartered stuff should be used, or the doors and sashes should be "built up" with the grain reversed, which will prevent warping and twisting. This latter method is expensive, but insures lasting and satisfactory work, but when economy is the rule, quartered stuff worked solid answers very well. The working of hardwood of any kind requires more skill, a better class of tools and more exact workmanship than

the working of pine or other soft woods, and these items alone entail extra cost. Where hardwoods are to be finished in a natural state great care should be taken to prevent lime stains, consequently it is better in all cases to put no finish until the plasterers have fully completed their work, for a lime stain on cherry or birch can never be taken out or completely covered without staining. In the absence of birch or cherry red beech makes a very handsome finish—in fact, beech has some beauties no other wood has, and when quartered and properly finished has a metallic sheen that is charming and unique.

Wood Warping. WOOD, particularly hardwood, that has not been properly sawn, is almost sure to warp or twist to some extent in the seasoning, and this is a matter that every contractor should see to when getting in a stock of lumber to be worked up. A board cut from the side of a log has the grain rings of the wood lying in circles having a greater length on one side of the board than on the other, and it is quite natural that these rings will endeavor to close as their circumferences get shorter by seasoning, and in closing they bend the board over, or, in other words, warp it. If the rings at one end of a board are out of line with the rings at the other end, which is frequently the case where the log was originally crooked, then the board will both warp and twist, as the rings do not shrink uniformly. Much can be done to prevent warping and twisting, in the piling of the stuff. The boards should be laid on their flat side with the side down that shows the concave or hollow curve of the rings; battens or weather strips should be laid across the pile at regular intervals, and always directly over the corresponding battens below; then another tier of boards on these again, and so on, until the pile is completed. The pile should have an inclination to carry off the rain, and should be topped off with rough boards enough to keep the pile dry. It is not best to pile the lumber where it will get too much sun or drying winds, as lumber seasoned too rapidly is apt to crack and check. Of course the best boards, boards that will not warp or twist, are "quarter sawn." It makes no difference what the lumber may be, whether it is pine, oak or ash, if it is quarter sawn it will not warp in drying nor yield so readily to changes of the weather. It has the disadvantage of being more expensive, as in sawing each quarter a narrow board is first taken, then one a little wider, and so on until the whole quarter is cut. Quartered oak, of which we hear so much now-a-days, never changes its shape after it is worked, "it stays where it is put," as the carpenters say, a quality that is very valuable. Another advantage of "quartering" is that you get all the beauties of the grain shown up to better advantage than if the boards were just "sliced" from the round log.

Sagging of Roofs. THE practice of cutting rafters so that their points in the plumb cut are close, while the lower part of the joints are left open, is bad, and not in accordance with good construction. When the points come together at the top and a small gap is left at the bottom, the roof is sure to drop as the weight of boards, shingles or slates is laid on it, and it will continue to drop until the joint in the rafter finds a solid bearing; this causes the ridge to sag in the centre and throw an uneven outward thrust on the walls. The gables support the ridge at each end and thus prevent the roof from settling uniformly along its length. In framing rafters it is always better to have the plumb cut at its point, proud at the lower part of the joint just a trifle, for no matter how true a roof may be framed, there will always be a small percentage of settlement, and when this takes place the rafters, if cut as suggested, adapt themselves to the changed conditions, and the bearing at their points becomes equalized. The fact of using a ridge pole makes no difference, as the sag will take place if the rafters are cut open at the bottom, just the same; in fact, if the ridge pole is formed of unseasonable stuff it will increase the sag to some small extent, owing to shrinkage. Rafters should be of sufficient section to sustain the regular load, including wet snow and rain, to which should be added 100 pounds to the square foot for cyclonic wind pressure. Light rafters may be very much strengthened by a generous supply of collar beams and braces. It is a prevailing fault with Canadian builders to frame their roofs with too light materials, and this is the cause of many a leaky and saggy roof in country places. There is quite a difference between the roofs of America and those of Europe. Here a few light timbers and a few pounds of spikes with a minimum of labor are about all that are employed on most of our domestic roofs. There, heavy timbers framed together with mortise and tenon, bolted with heavy iron bolts and tied with iron straps, is the manner which obtains. Their roofs last a half dozen centuries, here they are old and weary at 25 years, but if proper attention was given, and honest construction prevailed, there is no reason why roofs built on our present methods should not live twice the years they do now.

Figuring on a Contract. OMISSION of items in figuring contracts is probably the most common cause of disaster prevalent in building contracting, and many a man who has intended well enough has been brought to grief because of having left out some things in his bill of estimates that ought to have been figured on. As we have before stated in these columns, every man who intends to become a contractor should prepare a minute schedule of all the items that could possibly be included in any manner of building construction. These should be classified and arranged under sub-headings, according to the different building industries or trades, and prices, when possible, should be added. It may take some time before a schedule of this kind can be completed; in fact, it may never be completed, for the continual changes that take place in styles and character of work, hardware and colors, will make it necessary to always keep the columns of the schedule open for additions. By having a schedule as suggested, and consulting it closely when making an estimate, the possibility of an omission will be reduced to a minimum. All successful contractors follow some such system as this in estimating, but the careless and unsuccessful contractor fails to see just where it would be to his interest to follow a rule of this sort, as the loss of time in preparing and consulting a schedule for every little thing would be a waste of time and loss greater than any benefits that would be derived. Every time a contract is taken below its actual worth every contractor in the neighborhood is injured thereby, as well as the man who does the work. If a man gets a house built for $5,000 that is actually worth $6,000 to erect, every man in the neighborhood will expect his work to be executed in the same proportion, and will object if tenders are submitted based on the larger figure. So, after all, it is to the interests of all contractors that even a rival should get a good living price for work done, and a contractor's ignorance or mistakes are a thousand times more to be feared in a bidding competition than an accurate competency in making estimates. In country places and in our towns and villages there are very seldom works of such magnitude that the local builder cannot encompass, but he should not forget that even in buildings of similar size, and built of similar materials, the style of finish may vary so much that he will be treading on dangerous ground if he adopts the method of estimating by "comparisons," for that system is delusive and will surely lead its adopter into trouble. Figure everything—leave not a nail or a screw unthought of, for it is just such small things that make all the difference between profit and loss. A contractor seldom makes mistakes in the larger things in a building. His figures for the walls, roofs, floors, stairs and other costly adjuncts are generally correct; and when a leak does take place, it will be found that it has its existence among the smaller matters in the contract; hence the necessity of having a reminder of all these little things at your elbow when making up an estimate. It may be a little troublesome to be obliged to refer to a schedule every time an item is to be figured on, but it should be remembered that money is not earned without trouble, and that it is much more satisfactory to know you are safe and sure, even if you have to work for it, than to take a contract at hap-hazard, and be sorry afterward.

Carpenters' Repairs. WE have always thought that charging an ordinary day's wages with a percentage of profit to the boss or contractor was not doing justice to the workman who may be sent to perform the work. Repairs, generally, are of such a nature that the workman is compelled to use tools or material he would not be called upon to work up if he remained in the shop, thus destroying or seriously injuring costly tools for which he receives no recompense. Repairs, too, are much more destructive on the workman's clothes, a matter of considerable importance to him, and a matter that ought in justice to be considered. Workmen as a rule do not like repairing, partly for the reasons mentioned, and partly because repairing about old houses is too often a very disagreeable service and seldom satisfactory to anyone. After much experience and observation in the matter of repairs, the writer has came to the conclusion that at least 25 per cent. should be added to the present scale of charges for this work, and that this extra percentage should be equally divided between the master-builder and the workman. In contracting for repairs, enough extra should be provided to pay the workman employed upon them, at least ten per cent. extra, for undue wear and tear of tools and breakages.

BUILDERS' SUPERSTITIONS.

"YOU would be surprised how superstitious some men employed in the building trade are," said an elderly builder's foreman representative. "For instance, it's considered by some a most unlucky thing to lay the top brick at the north side of a building. I've known men do all sorts of things to escape this duty. They will undertake some harder work, sham dizziness, or even lose half a day's work. To brick-up in the recess of a wall a cast horseshoe with a penny tied to it is usually recognized as a sure forerunner of a season when work is plentiful. Another belief, that by substituting a sovereign for the penny a man will never meet with an accident or be out of work, is very often talked about; but I have never heard of a man trying it. All sorts of things are bricked up in walls, 'just for fun,' and not because they have any charm or good omen about them. Newspapers, old boots, bottles, and such-like things are served in this way, and a favorite way of playing a joke on a 'mate' is for a man to conceal his beer can in the wall, and then build it in."

PROMINENT CANADIAN CONTRACTORS.

IV.

MR. F. T. HARDING.

ALTHOUGH only thirty-five years of age, Mr. F. T. Harding, who forms the subject of this sketch, has already attained a prominent position in the contracting field, being senior member in the firm of Harding & Leathorn, of London, Ont. He was born in Cornwall, England on April 12th, 1862, and after leaving school

MR. F. T. HARDING.

resolved to seek his fortune in America, arriving in New York in the year 1880, where he remained for only a short time. For two years he was engaged in contracting work for the Pennsylvania Mining Company at Iron Mountain, Michigan, leaving there in 1883 for London, Ont., where he commenced business as a general contractor. In 1885 he became associated with Mr. Christopher Leathorn, when the partnership now existing was formed.

Mr. Harding is endowed with unflagging energy, to which can be attributed much of the success which he has attained. He is recognized as a reliable and conscientious business man, and enjoys the full confidence of all who have business transactions with him. He is a member of the Masonic Society, an advanced thinker on social problems, and a constant reader, by which he is kept in touch with the many improvements affecting his business.

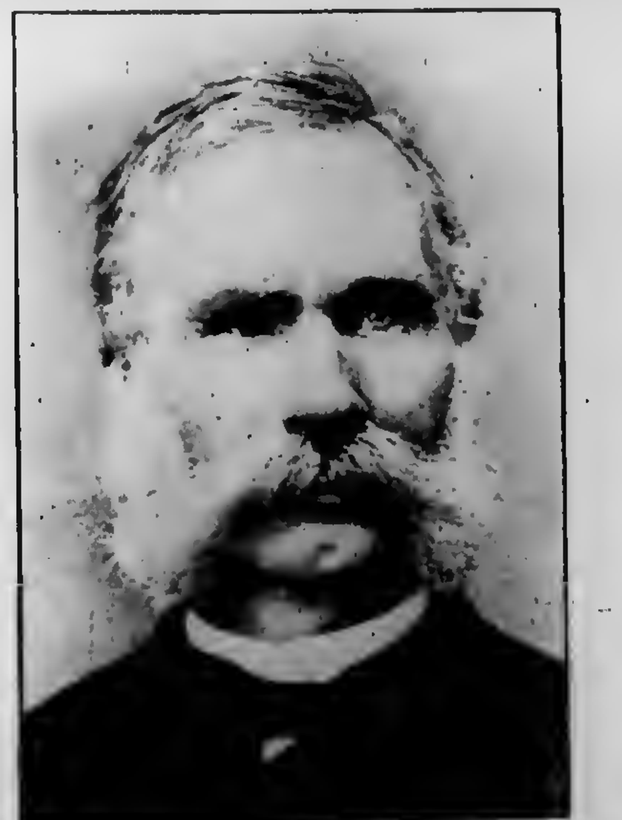
The firm of Harding & Leathorn have constructed a number of important works, among which are the Petrolia trunk sewer, the waterworks systems at Wiarton and Goderich, and a number of contracts in connection with the London waterworks, being now engaged in building sections "P" and "F" of the new London sewerage system, a work which requires skilful workmanship and careful management.

PLUMBING, OLD AND NEW.

We are pleased to be able to present to readers of the Canadian Architect and Builder the accompanying portrait of one of the oldest plumbers on this continent, Mr. N. McNeil, of Kingston, Ont., together with some particulars from his pen of the changes which he has witnessed during his long connection with the trade. Mr. McNeil, who is still in business in Kingston, and recognized as being fully abreast of the times, writes as follows :

Although I have very little time at my disposal, at your request I will give you a hurried sketch of what the plumber trade was as I knew it nearly sixty years since. I commenced my seven years' apprenticeship to the trade in 1839; the indentures, fully and honorably discharged, with the signatures of the interested parties, lie before me.

Plumbers in those days were true to name—from "plumbum, plumber, a worker in lead." Lead, nothing but lead! We made our sheet lead, for which purpose



Mr. N. McNeil, Kingston, Ont.,
A Veteran Canadian Plumber.

we had two casting frames, a large and a smaller one. We made lead pipe from 2-inch upwards—2½, 3-inch, etc., for pumps of steam engines, etc.; the seams were wiped. In the case of pipe of the above sizes for chemical works, we burned the seams. The pipe was filled with sand; one man poured lead in the seam from his ladel, another man or boy with a small stick as he poured felt for the smooth sand inside. Small sizes of lead pipe as we now know it, also sheet lead, were made in Liverpool under a patent. There was no lead pipe nor sheet lead as we see it made in Scotland—both were brought from Liverpool. Two or three years after this Messrs. Newton, Yeats & Co. started to draw lead pipe and sheet lead in Glasgow.

The art of working sheet lead is comparatively unknown to the plumber in America, as there is no roofing done here. We do not now make our soil pipe bends; at that time we made lead soil pipe, waste pipe, bends, traps, etc.

At the time I speak of the D trap was the trap in use everywhere for closets, sinks, etc. I saw several lots of D traps made as shop work. The S trap was just introduced as a new thing, and as we knew he was a good hand who could make a neat 4-inch S trap, by and by we got to make them off a solid block. Our old friend the Dan closet was in general use, and long anterior to this date. At this time there sprung up a rival in Brama's patent valve closet; it was expensive, and its action uncertain; the ship closet of the present day is a modification of it. The Brama closet soon died out, and left the Dan closet, with all its faults, the general favorite. When speaking of this closet I may remark that my former apprentice, William Smith, of San Francisco, made some improvements in the manufacture of the Dan closet, which he patented. Presently he had to fight in the law courts for the protection of his patent with a wealthy New York firm. Smith afterwards invented the syphon jet closet, and before he could reap the reward of his labors he was again drawn into litigation, which left him without a dollar. On the completion of his apprenticeship in my shop in Kingston, he wrought at the trade in Chicago, then went to San Francisco and commenced manufacturing, and thus became identified with that city. When I revisited Glasgow in 1883 I saw Shanks' syphon tank used as a wash-out. Some time after my return I fitted up the first wash-out or National closet, and we are now elaborating that principle.

To return to my younger days again, when a comparatively young apprentice I was sent to the Highland Society's School to repair a water closet. This closet was fitted up in a small space under the pitch of a stair, with little or no head room. The tank, with ball cock, etc., was on a level with the closet. I was so taken up with the odd affair that I made a rough sketch of it, which I retain till this day. Zane's sanitary closet is, as it were, an exact copy of it, the only improvement being that it is made portable. About the same time I repaired a closet at a way station on the Wisha & Coltness Railway, now a part of the Caledonian Railway system. That closet had a standpipe at the back which served the purpose of a tank to wash out the closet. The Felly self-acting closet, or Malcolm's closet tank, are on the same principle. Now, while it is quite likely that the idea was new to the party who got up the Zane closet, and likewise new to those who got up the Felly tank, nevertheless new ideas in plumbing work have been introduced in America which were very old and in general use in the Mother Country. As an illustration, the Unique bath, or basin waste, was old and in general use when I entered the trade. The valve and valve pipe, with overflow on same, with valve pull and plate on top, made the finish with the lever of hot and cold cock on either side. Those supplies were soldered on to the sides of the valve pipe. I fitted up baths on that principle in the Commercial Bank, Kingston, and in the Commercial Bank, Belleville, early in the fifties.

With the introduction of brass pipe at a reasonable price, those fixtures have been got up in a portable form. How slow we are in introducing new schemes after all, and with all our activity! I conveyed out to and fitted up in the Gartnaval Lunatic Asylum, Glasgow, one of the first, if not the very first, needle bath. It was made of copper pipe in the shape of a cone, perforated with fine holes towards the inside. The pipes were fixed in a vertical position, bent in towards the top. That was in 1844 or 1845.

But this must suffice. Although the plumber of today may have lost much of the cunning or art of working lead, he has to contend against a hidden law of nature that did not appear to trouble those of a former generation. The architect and the plumber, as practical sanitarians, are working hand-in-hand trying to overcome an almost insurmountable difficulty—sewer gas. But this is too large a field for me to enter upon now.

PRESIDENTS OF CANADIAN PLUMBERS' ASSOCIATIONS.

MR. J. A. CASTLAKE.

In the city of Stratford, Ont., the master plumbers recently organized for the improvement of the trade, and elected as their president Mr. J. A. Castlake, whose countenance is portrayed on this page. Mr. Castlake was born on November 16, 1864, in the city in which he now resides. He was apprenticed to learn his trade with W. R. Anderson, of Collingwood, in 1883. After the completion of his apprenticeship he worked for Mr. J. C. Gilpin, of St. Marys, for a short time, and then with Mr. Climo, Jeffrey Bros. and E. Dunsmore & Son, of Stratford. The latter firm was changed to Dunsmore Bros., and upon the retirement of one of the partners, Mr. Castlake became a member of the firm, which partnership continued for two years. On the first of July, 1883, he started in business for himself, and by close attention to the details of his work has worked up a good trade. Mr. Castlake is enthusiastic

Mr. J. A. Castlake.

in association matters, and states that although all the plumbers in the city have not yet joined, they have started out with good prospects of success.

THE PLUMBERS' CONVENTION

Arrangements are now well completed for the second annual convention of the Dominion Master Plumbers' Association, which will be held in Toronto on July 1, 2 and 3 next. The programme, both from a business and social standpoint, is sufficiently interesting and varied to warrant a large attendance, and every member of the Association should endeavor to be present to assist in promoting the interests of the trade. A meeting of the Entertainment Committee was held last week, at which the following programme was outlined :

The Executive Committee will meet at the Palmer House on June 30th. The convention proper will open in the rooms of the Toronto Association, Pythian Hall, at 9.30 a.m. on Thursday, July 1st. Three sessions will be held that day, and probably a short session on the morning of the following day. On Friday afternoon an address of welcome will be delivered by the Mayor on behalf of the city, after which a tally-ho drive will be given the delegates. In the evening a banquet will be held in Webb's parlors, Yonge street. On Saturday an excursion to Niagara will take place, to which every master plumber in the Dominion is invited. Reaching Niagara Falls, dinner has been arranged for at the Dufferin Cafe, and the afternoon will be spent in viewing the beauty of the Falls and vicinity, returning to Toronto at eight o'clock.

Arrangements have been made with the railway companies to give a special rate of fare and a third for the round trip to members of the Association, good from the 30th of June to July 5th. The headquarters of the members will be the Palmer House, which has given a special rate of $1.50 per day.

The master plumbers of Toronto are sparing no effort to make the Convention a success, and no doubt a very large number of plumbers from different parts of the Dominion wlll avail themselves of the opportunity thus afforded to visit Toronto. Mr. J. B. Fitzsimmons is chairman of the Entertainment Committee.

CHIPS.

The McClary Manufacturing Co., of London, Ont., contemplate the establishment of a branch of their works in Montreal.

A return brought down in Parliament recently shows that the bounties paid on iron and steel manufactured from Canadian ore since February, 1896, is as follows: On pig iron, 42,404 tons, $84,809; iron puddled bars, 4,353 tons, $8,708; steel billets, 35,757 tons, $71,514.

Under the microscope, a surface painted with zinc oxide shows no porosity; in fact, it is almost a perfect enamel. Consequently, if damp wood be painted with zinc, there is no way for the moisture to escape except by forcing off the coating of enamel. A certain per cent. of silica added will, however, render it porous, so that any vapour or steam may pass through.

We regret to have to announce the recent failure of Messrs. Tallman & Son, proprietors of the Beamsville Pressed Brick Co. An assignment has been made to Mr. W. G. E. Boyd, assignee, Hamilton, Ont., for the benefit of creditors. The long-continued inactivity in building enterprise was a leading cause of the failure. The firm had an expensive plant, which it is hoped may shortly be put to use again.

A new cement, called petrifite, has been introduced in the market in England. The composition of the material is not known, but it resembles Portland cement in its general action. While it is employed chiefly in the manufacture of piping, slabs, tiles, conduits, etc., in conjunction with cement, yet, if powdered, it will bind together in a solid, stonelike mass a number of substances, such as wood, paper, pulp, earth material, sea sand and powdered slate.

"American Plumbing Practice" which has just come from the press, is a compilation of illustrated descriptions of plumbing installations in modern buildings of every character, together with Notes and Queries touching interesting points developed in practice, from articles which have appeared in the Engineering Record. The book is a well bound quarto of 259 pages, and contains over 300 illustrations. Published by the Engineering Record, 100 William street, New York.

A discovery of black granite is said to have been made at Welsford, N. B. The property has been acquired by a Bridgewater, Nova Scotia, firm, and they will commence the erection of polishing works. There is an excellent water power on the property for the working of hydraulic drills and polishers. The owners of the quarry have secured a contract for 2,000 tons of rough stone which will be shipped from St. John to Aberdeen, Scotland, during the summer and winter. The getting out of this stone and the opening up of the quarry will take most of the summer, and in the fall the polishing works will be built and equipped.

The Halifax Chronicle says that a new industry is soon to be started in Halifax county. Nearly two months ago an English syndicate sent an agent to Nova Scotia for the purpose of searching for a suitable material for the manufacture of terra cotta, and as the result of his research it is understood he has been instructed to purchase some property in Halifax county, build a factory and manufacture terra cotta. The output of the factory will be sold both in the United States and Canada. It is said that terra cotta made there can be sold cheaper in Boston and New York by this company than by the companies who are supplying those cities at the present time.

VENTILATING BY ELECTIRICTY.

How easily large halls can now be ventilated is seen in the recently installed plant for lighting and ventilating the house of representatives and the Senate Chamber in Washington. The system of ventilation which is already in operation in the Senate is illustrative of the best modern practice. The fans under the flooring are twelve feet in diameter, and are driven by electric motors of 18-horse power each. There is also a fan on the roof, which is connected to an eight-horse-power motor. The pure air is drawn from a stone tower, situated on the north-west section of the capitol grounds, and passed between steam piping before it is driven up through the double air-tight flooring and into the Senate Chamber. At the front of each of the numerous desks provided for the senators are a number of perforations, and through these holes the air passes inward. Each desk is provided with means of shutting off the supply of air, or regulating it. An ice plant is to be erected later, and in warm weather the air will be cooled before being forced into the chamber.

THE LOSS OF HEAD DUE TO ELBOWS IN PIPES.

In a series of articles describing the engineering department of the Yorkshire College, Leeds, Engineering has given some particulars of the results of experiments conducted in that institution to ascertain the effect of the friction of water in a pipe fitted with sockets, elbows, tees, bends and a sudden enlargement. The experimental pipe was half an inch in diameter, and the friction was measured by loss of head in the usual way. It is shown in works on hydraulics that the loss of head due to resistance of this nature to the free flow of water in a pipe may be expressed in terms of a length of plain pipe that will give the same loss of head due to friction. Experiments extending over several years show that the loss of head resulting from a socket is equal to that due to from 15 to 17 diameters of the plain pipe ; while that of easy right-angled bends may be from 10 to 15 diameters ; and that due to sharp right-angled elbows from 30 to 36 diameters. At one place the experimental pipe is suddenly enlarged to five times the regular diameter. The total loss due to this and the contraction should, by calculation, be equivalent to the friction of 1.92 feet of this half-inch pipe. Experimentally, however, the loss is only equivalent to the friction of a length of from 1.2 to 1.4 feet. The experiments show the detrimental effect of sharp elbows on the dischargiug capacity of a pipe system.

TESTING THE STRENGH OF SOIL FOR BUILDING.

There is very little to be found in technical literature on the weight that certain soils will support. The few tables extant generally do not indicate with sufficient clearness under what conditions they have been compiled. Rudolf Mayer describes, in the "Zeitschrift des Oesterreichischen Ingenieur und Architekter Vereins," an instrument specially devised for this purpose. It is certainly not complicated, and though it is hardly meant for the ordinary builder, it may prove useful in its present or an improved shape. There is a heavy piston screwed into a cylindrical guide block carrying a platform on its top, on which the weights, iron plates of about 20 lbs. weight, are to be placed. The piston and its guide slide in a strong cylinder, which forms one casting with the bed-plate. This bed should be wide. There are, further, three legs in the plane of the bed, with pins at their ends, by means of which the instrument is fixed in position. The guard carries a sidearm holding a micrometer screw dipping below into a mercury cup, from which a capillary tube branches off. The diameters of the cup and the indicator tube are such that the depression of the screw is marked tenfold. When the weights are applied the piston will sink more and more, fairly proportionally at first ; this would graphically give a straight line. When the line changes into a curve which becomes steeper and steeper, it is clear that the bearing limit ot the soil has been reached.

PERSONAL.

Mr. John C. Burrows, a well-known contractor of Hamilton, died in that city last month.

On the 26th of May Mr. Alfred McInnes, of the firm of John McInnes & Co., contractors, Halifax, N. S., was married to Miss Conrod.

Messrs. W. T. Whiteway and W. T. Horton have formed a partnership as architects at Halifax, N. S., under the style of Whiteway & Horton.

Mr. Thos. M. Buley, painter and decorator, who had been in business in Toronto for 27 years, died at his residence on Denison avenue early this month.

The death is announced of Mr. John Drury, builder, of St. John, N. B. Mr. Drury was born in Sussex, but removed to St. John when very young. For thirty-five years he carried on a successful business, and erected many of the finest buildings in the city.

A prominent resident of Toronto passed away a couple of weeks ago in the person of Mr. William Hill, builder. Deceased had been a resident of that city for fifty-four years. He was born at Tadcaster, Yorkshire, England, in 1819, and came to Canada in the forties. He obtained his first employment in Toronto upon the Insane Asylum on Queen street, which was then in course of construction. In 1866 he sustained a double fracture of one leg and a broken ankle on the other by falling a distance of 65 feet, from which he was permanently lamed.

CHIPS.

The corner stone of a new public hospital building at Cornwall, Ont., was laid by the Hon. A. S. Hardy, Premier of Ontario, on the 14th inst. The building is being erected with funds donated for the purpose by the late Mr. John Purcell.

The brickmakers of Hamilton, Ont., have lately increased the price of bricks from $4.25 to $5.50. Some time ago, when there was competition among the brickmakers, brick was selling for $3.50 a thousand, but the price has been gradually increased to the figure named.

USEFUL HINTS.

Lac Water Varnish.—Shellac, 6oz. ; borax, 1½oz. ; water, 1 pint. Boil together until the lac is dissolved. If bleached lac is used, a white varnish will be made ; if the orange shellac, the varnish will have a pale brown color. This varnish makes a fair vehicle for water colors. It is a good paper varnish, and dries with a fair lustre and with a hard coat, which is waterproof. By adding any of the soluble coal tar colors colored varnishes can be made.

Glue Varnish.—Dissolve 1lb. of good pale glue in two gallons of water. The color of this varnish depends very much on the quality of the glue used ; if the best gelatine, then a white varnish will be made ; if a brown glue, then a brown varnish. This varnish is not very good, because of the sticky coat it gives, which is not waterproof. By adding, just before using, a small quantity of bichromate of potassium (1oz. in two gallons), the coat becomes nearly waterproof. It is important that the bichromate be added just before use, as it would act on the varnish and cause it to set into a gelatinous, unworkable mass. This varnish forms the basis of some leather varnishes. A little thymol or borax may be added as a preservative.

New Putty for Metals.—A new putty for metals, says the "Gewerbe," is being offered for sale from Switzerland. It is a metallic alloy, which melts at about 250° C. (482° F.) like lead, and can be poured into the finest moulds on account of its easy fusibility. Another characteristic of this new putty, and one which recommends it especially for use is the great binding power which it shows in union with all kinds of materials, such as stone, masonry and metal. Owing to its great density, it is greatly adapted for repairing leaks in water and gas pipes, oil receptacles, etc. Its low specific gravity, which is about 1.5, as well as the circumstance that it expands in cooling, thus securing absolute tightness of the puttied fissures, have caused it to meet with a favourable reception. When the putty is to be used, break it into small pieces, and melt these in an iron kettle over a moderate fire, thus obtaining a highly fusible mass. For casting small objects, lime made of plaster of paris, loam or sand may be used.

USEFUL HINTS.

Olive green walls may have gold predominating in the frieze, woodwork and cornice antique oak, ceiling in vellum, the upholsterings of a pronounced red with bronze prevailing in the draperies.

The best method of making a whitewash for outside exposure is to slack half a bushel of lime in a barrel, add one pound of common salt, half-pound of sulphate of zinc, and a gallon of sweet milk.

Bottle-green walls should be accompanied by a frieze with Indian red prevailing, antique oak wood-work, deep sienna cornice, ecru ceiling with upholsterings brown and Indian red, and sharp Indian red draperies.

The following is an excellent paint for wirework:—Boil good linseed oil with as much litharge as will make it of the consistency to be laid on with the brush; add lampblack at a rate of 1 part by weight, to every 10 parts of the litharge; boil three hours over a gentle fire. The first coat should be thinner than the following coats.

The experiment made by Captain W. de W. Abney, C. B., in the Raphael Cartoon Gallery of the South Kensington Museum, London, of using colored glass to intercept the rays of light which act injuriously on pigments is said to be considered quite successful. The colored glass is hardly noticeable, and many people walk through the gallery without being aware of its existence. The system will probably be extended to the skylights of all the picture galleries in which water colors are hung.—Building News.

Mr. James Elliott, of St. Marys, Ont., is putting in a stone crushing plant in connection with his stone quarries.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS

NOTICE

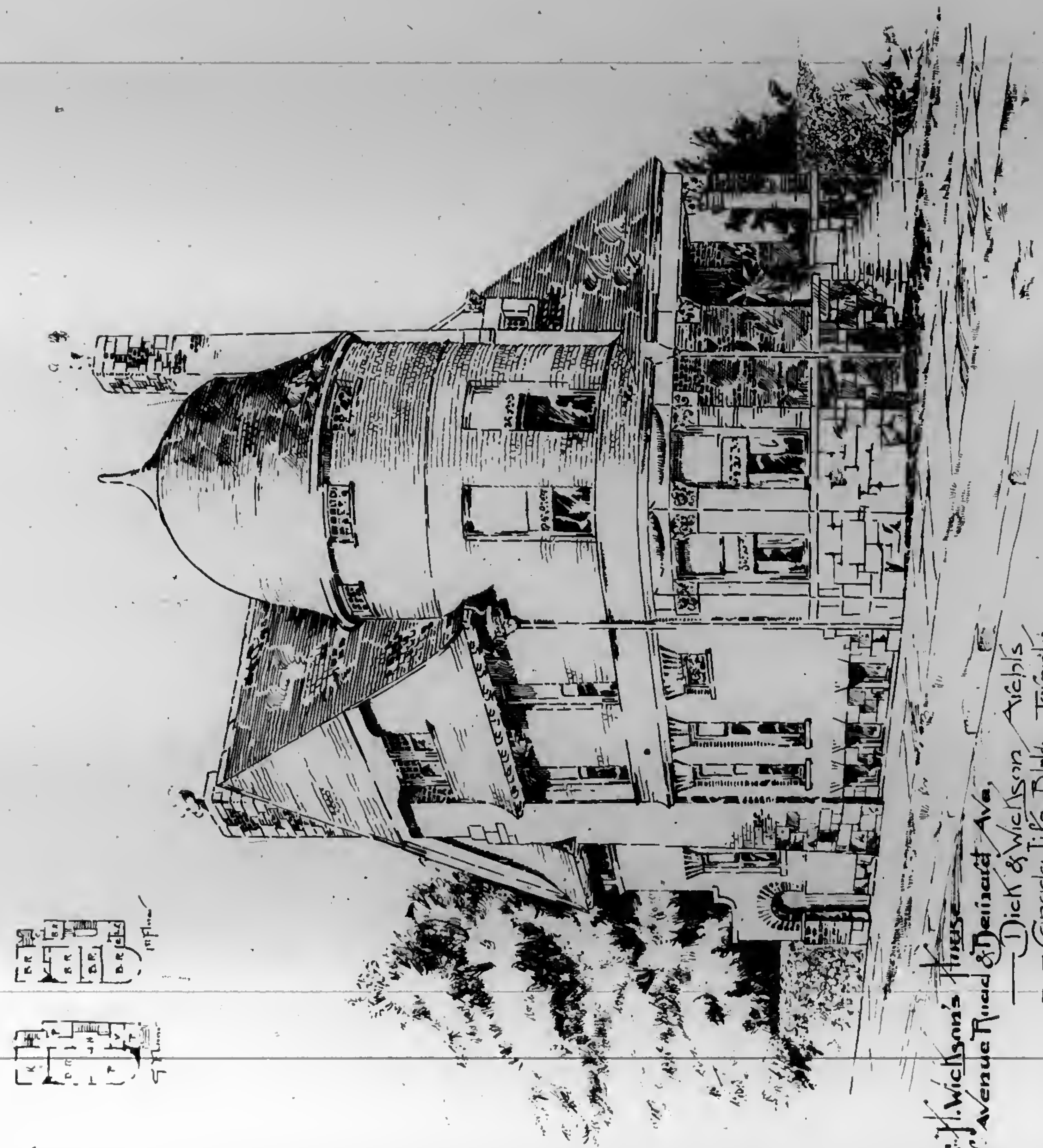
The Semi-Annual Examinations for admission to study of Architecture and for registration will be held on Wednesday, the 28th, Thursday, the 29th, and Friday, the 30th July, 1897, in the rooms of the Province of Quebec Association of Architects, New York Life Building, Montreal, at 10 o'clock in the forenoon each day.

Intending candidates are required to give one month's notice to the undersigned accompanied by the necessary fee.

For Admission to Study $10.00
For Registration 25.00

JOS. VENNE, Secretary P.Q.A.A.
17 Place d'Arms Hill, Montreal

Montreal, June 8th, 1897.



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TRINITY COLLEGE, TORONTO—FROM A SKETCH BY C. M. MANLY, R. C. A.

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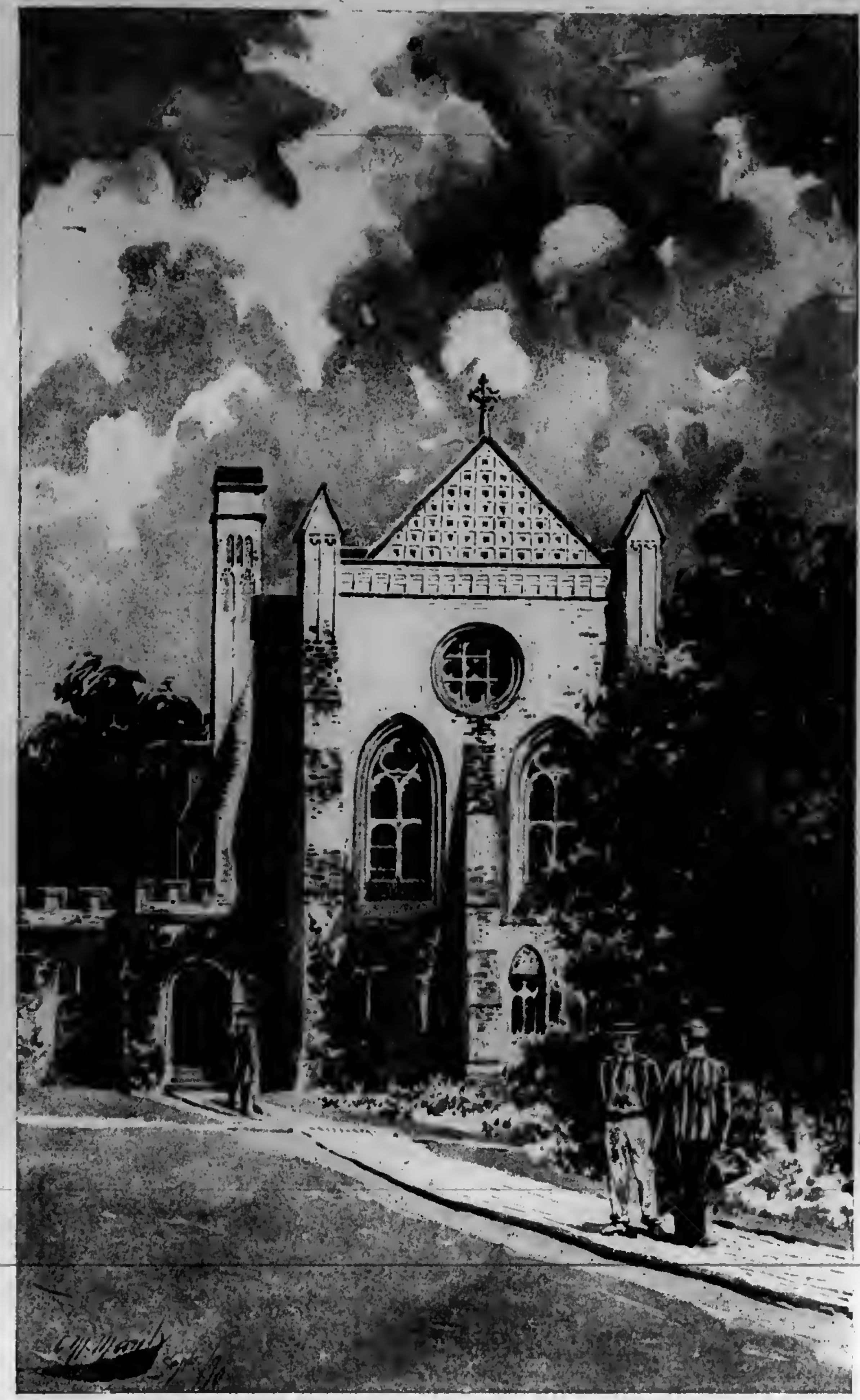

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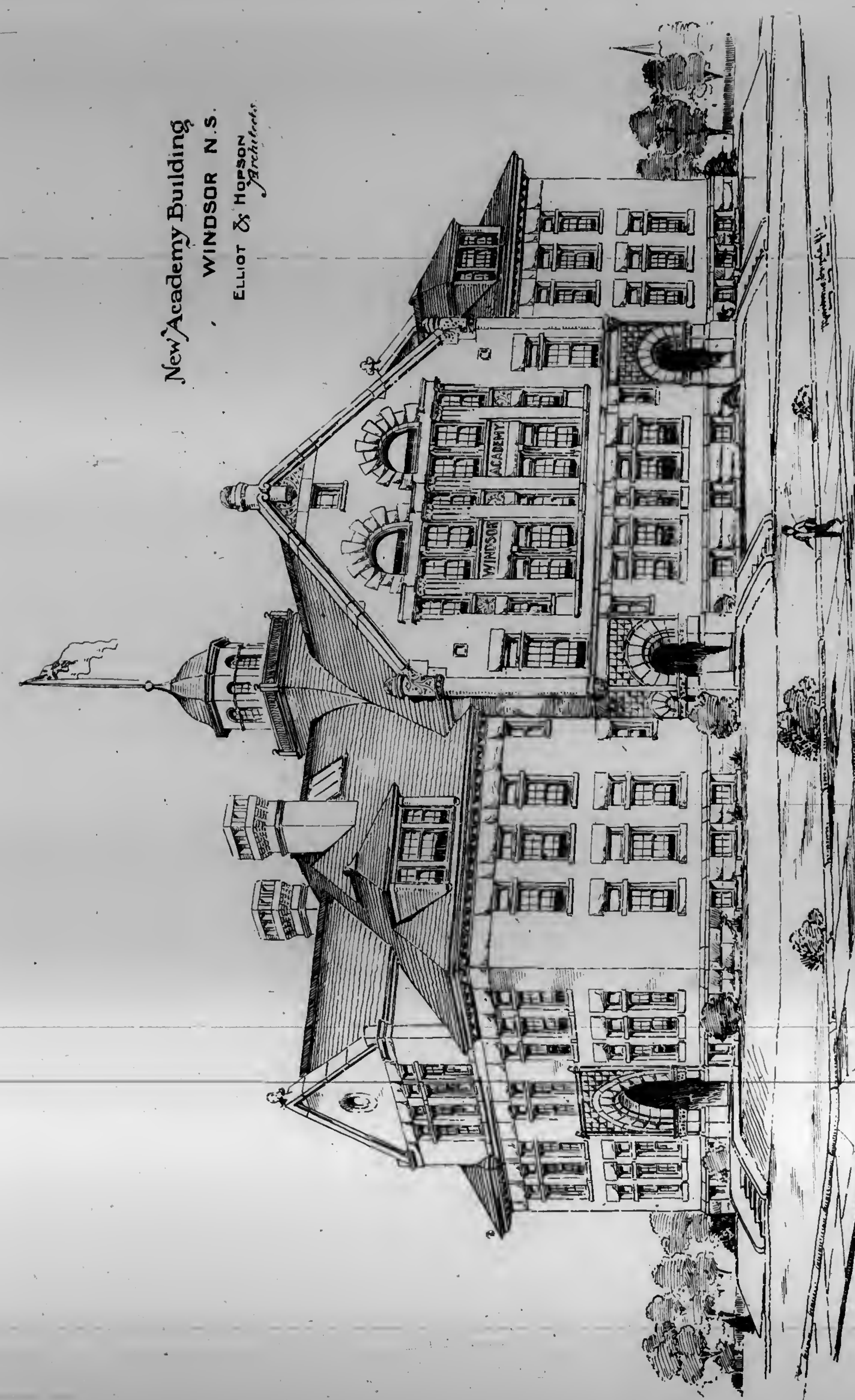
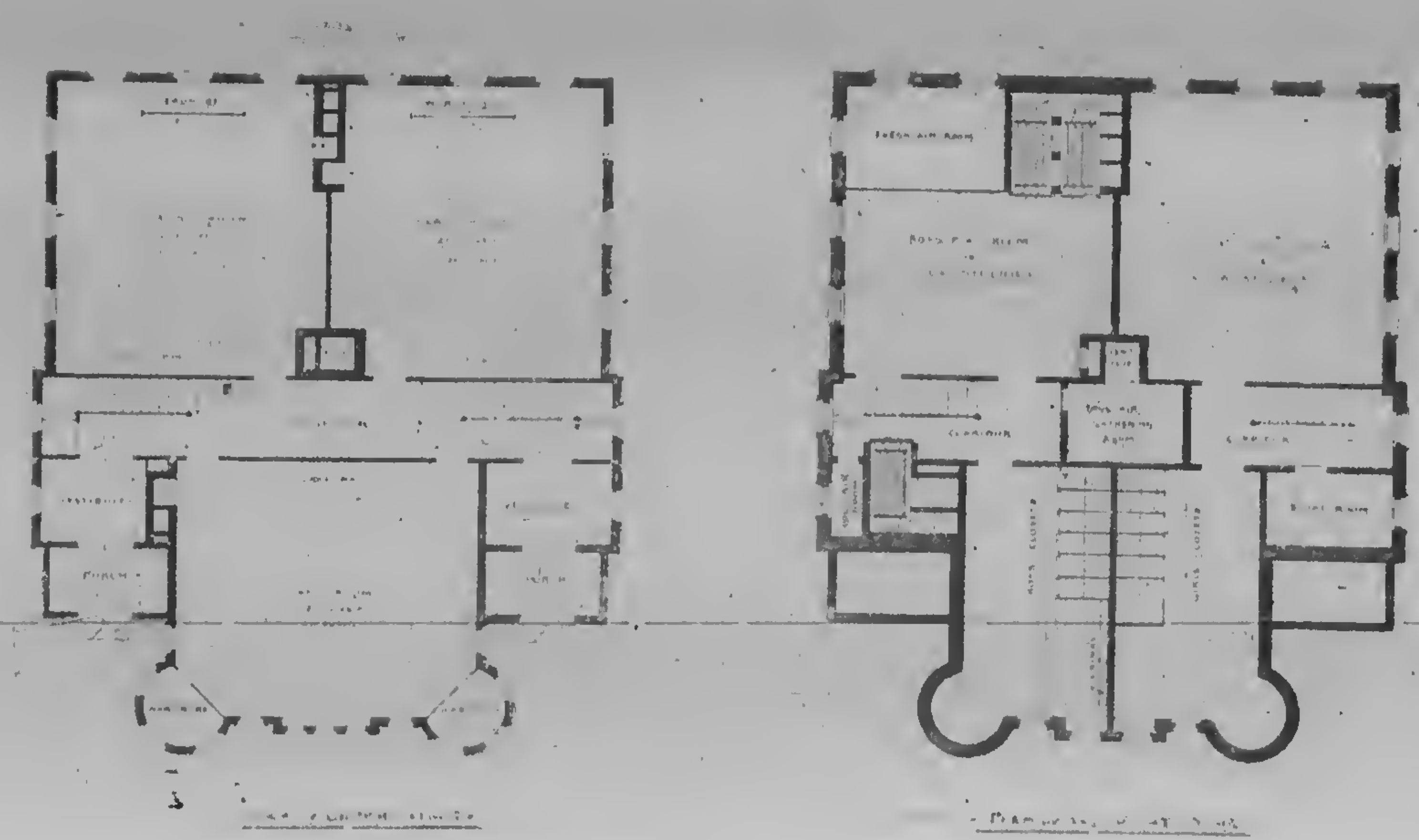


NEW ACADEMY BUILDING, WINDSOR, NOVA SCOTIA.
ELLIOT & HOPSON, ARCHITECTS, HALIFAX, N.S



Proposed Public School Building at Newmarket. Large Scale Perspective View.

Competitive Design for a Public School at Newmarket, Ont.

J. Wilson Gray, Architect, Toronto.

CANADIAN ARCHITECT AND BUILDER.

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—THE—

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Automatic Fire Protectors.

IF it were not for the costly consequences, one might be inclined to laugh at the heat of the sun, reflected through a glass skylight on to automatic fire protectors, causing the protectors to blow out, and the consequent flooding of the building. But this recently happened, and caused "damage by water" to the extent of thousands of dollars. In future these automatic systems should be themselves protected by a liberal supply of ice piled up round them in hot weather!

American Bricks for South Africa.

A SHIPMENT of 200,000 bricks was recently made to South Africa by the Union Brick Works, of Tacoma, W. T. The purchasers were the Lingham Timber and Trading Co., of Delogoa Bay. The price obtained is said to exceed by three or four times the cost of production, hence a handsome profit will be realized. As this is believed to be the beginning of an extensive and profitable foreign trade, the attention of Canadian brick manufacturers, especially those of British Columbia, is directed to the subject. Shipments of Canadian dry pressed bricks have been made to South Africa, but we have not heard that any ordinary stock brick have as yet found their way to that country.

The Proposed Central Park in Toronto.

THE suggestion of a central park for the city of Toronto appears to be received very favorably. The next thing, of course, is the provision of funds—provided the owners of property decided for the purpose can be induced to part with their lots for reasonable sums. It is certainly a very good idea for the improvement of the city, and will add greatly to the appearance and dignity of the new Court House to have an ornamental piece of ground near it. The clearing away of so many of the old houses, sheds, shops, yards and lanes will be a matter of congratulation if it can be brought about, and the improvement thus effected should enhance the value of adjacent property. There can be no doubt that Toronto is a beautiful city. The residential parts compare favorably with the much-praised cities of other countries, although much that is an eyesore, much that is bad from a sanitary point of view, and much that is dangerous and inviting to the fire fiend still remain, and the sooner these can be cleared away the better. A central park would pretty near complete Toronto, which is so favored by its natural surroundings. The woods and ravines of Rosedale are no mean adjuncts to the city parks, and approach has been made easy to a part at

least of the chain of ravines by the new Ravine Drive, which connects with the great stretch of the at present incomplete Riverdale Park, which will be nearly a mile long by a quarter of a mile wide, and which is probably not well known to the majority of Torontonians, who, though they have heard of it, have probably not visited it. This park has been already several years in progress, and will be several more before complete, but it is a novel and most inexpensive method that is being taken to attain the object. The labor costs the city nothing, as it is entirely carried out by the prisoners of the jail; but as this enforced labor is objectionable to the tramps, there are but an average of twenty-five or so at work every day, whereas when the work was first started there used to be double that number available; they now steer clear of Toronto.

The Toronto Hotel Project.

FROM a reliable source we learn that a Chicago architect and capitalist have been in Toronto during the last week in connection with the project for the erection in that city of a first-class modern hotel. These gentlemen have made careful enquiries into the cost of building materials, and other matters affecting the carrying out of the enterprise. We have not learned what steps are being taken to finance the scheme, but hope to see the undertaking take tangible form in the near future. The Old Upper Canada College Grounds on King street west, seem to be regarded as the most favorable location for the proposed structure. Toronto has reached the point where improved hotel accommodation has become a necessity. There seems, therefore, no reason why the undertaking should not prove successful. So far as the cost of erecting the building is concerned, there is never likely to come a more favorable time than the present, when prices of building materials and labor are at a minimum.

Alien Labor Law.

UNNEIGHBORLY conduct, whether practiced by an individual or a nation is likely to prove unprofitable by reacting upon those whose selfishness prompts them to it. For several years Canadians have been prohibited by the alien labor law enacted by the government of the United States, from finding employment in that country unless they and their families become residents of the Republic. This law brought great hardship to workmen in the border towns of Canada, who for years had been accustomed to cross the line daily. This law is looked upon as being unworthy of a great nation, and it was expected that after the Presidential election was over, it would be repealed, inasmuch as it was known to have been enacted with an eye to securing the votes of the trades organizations. It having become apparent, however, that the obnoxious measure is to be allowed to remain in force, pressure was brought to bear on the Dominion Parliament at its last session to place a similar law upon the Statute books of Canada. Accordingly we have now a Canadian Alien Labor Law, under which foreigners are to be prohibited from obtaining employment in this county. The effect of this law is likely to be immediately felt in the United States in connection with the construction of the Crow's Nest Pass Railway, the Victoria Bridge, and other large undertakings, contracts for some of which have gone to American firms. The probability is that for some years to come undertakings of this character will be more numerous in Canada than in the United States, so that the balance of advantage will be on the side of Canadian workmen. From an abstract point of view we have no sympathy with enactments of this character but when we find ourselves alongside so unfriendly a neighbor, nothing remains but to protect our interests. In this connection, it is learned that under the new Canadian tariff certain kinds of structural materials, such as bridge material, is admitted under a lower rate of duty than formerly, with the result that American companies have been enabled to secure a number of important contracts in Canada. This is a matter which the Dominion Government should carefully examine into. The Canadian manufacturer and contractor is certainly as much entitled to consideration at the hands of the Government as the Canadian workman.

The Tender System.

THE system of inviting tenders for works of importance is one that no reasonable contractor will find fault with. When carried to extremes, however, it becomes a nuisance. The hard times of which we have in recent years heard so much, have led the large, as well as the small, contractors to look closely after contracts whether little or big. This evident anxiety to secure business has induced persons to invite competitive bids even for contracts of trivial amount. A case was recently brought to our notice which will serve to illustrate the absurd extent to which the system of inviting tenders has been carried and the nuisance it has become. A person living in a town in Western Ontario wanted to purchase a furnace which should cost about $110. He addressed a postal card to a dozen manufacturers asking not only for quotations, but for a personal visit. The expense of such a visit would be about $15. Presuming that all the manufacturers complied with the request as some are known to have done, they would expend in travelling expenses the sum of $165, or $55 more than the entire cost of the furnace. And to what purpose! In order that the purchaser might save a ten dollar bill.

Municipal Control of Building Construction.

IN continuation of our remarks last month in connection with recent fires, a very serious fault in municipal management and control of buildings is for the fiftieth time brought prominently before us. We have a department in which plans of buildings are supposed to be examined and permits for carrying out said buildings are supposed to be granted after plans have been approved and shown to be in accordance with existing building by-laws. That this department is faulty in extreme is shown by the simple fact that it is possible to find serious fault with the construction of buildings after they have been erected. That doubts should exist in competent minds as to the stability of such buildings when completed proves that the plans have either been passed by incompetent minds or examined with so little judgment that it would have been as well if they had not been examined at all. There may be differences of opinion about limiting floor area, about central light wells, elevator shafts and so forth—opinions which must to a certain extent be regulated by the necessities of the purposes for which the building is intended—but there can be no difference of opinion as to sufficient protection for steel and iron stanchions and girders, which may be supports to important walls and piers. Certainly the city should be liable for permitting such iron supports of main walls to stand absolutely unprotected, an easy prey to fire, and even if no fire occur, constituting a continual menace to public safety through the action of the weather—the effects of heat and cold—and of rust, which it is now well known eats away the metal under paint.

Another matter which is absolutely overlooked by our authorities in the office for the examination of plans is, sufficiency of exit in the event of fire for the large crowds which frequent the departmental stores. Even where the site has streets or other open spaces adjacent to the outside walls, advantage is not taken of the fact that it would be a simple matter to pierce these walls with doorways and to have outside iron fire stairways from all the upper flats. It has been shown by actual tests exactly how long it takes to empty certain buildings of the crowds frequenting them. It is known exactly what proportion of door space will allow of the escape of a crowd in the event of fire. Surely it is time to insist on the provision of better exits. Had the fire at John Eaton's taken place in the day-time, it is safe to say that in the short time from the outbreak of fire to the collapse of the main walls but few could have escaped, and there would have been a disaster almost too horrible to contemplate.

BY THE WAY.

ALL the enterprise is not confined to this side of the Atlantic. A Bohemian manufacturer is reported to be making roofing tiles by the dry press process. They are said to present an excellent appearance, but are open to the serious objection that they absorb too much water. It is not unlikely that means will be found to overcome this fault.

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THE CONTRACT RECORD formed a feature of an amusing incident which recently occurred on an east bound train. It was during the late heated term that a couple of representatives of Toronto supply houses found themselves on board the same train and bound for the same destination—Ottawa. With the view of enhancing their comfort they divested themselves of their coats, which, by the way, were much alike in color. After a time the owner of one of the coats was about to resume his garment, when his companion stopped him by saying, "Hold on there—you've got my coat." "No, I haven't," was the reply. "Oh, but you have," rejoined the other, "and in proof of my statement there's the CONTRACT RECORD sticking out of the inside pocket." "That's no proof," said the man with the coat, "for I too have a copy of the CONTRACT RECORD in my inside pocket." And so it proved to be.

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I HAPPENED to be in a gentleman's business office in Toronto the other day, when the representative of an American firm called to solicit an order for goods. "No," said the gentleman, "I don't want any Yankee goods. I've made up my mind not to buy a dollar's worth of American stuff if I can possibly get what will answer the purpose in Canada or elsewhere." On asking the reason of this unexpected rebuff, the American was told that it was due to the treatment which was being accorded to Canada by the government of the United States under the Dingley Bill. I fully approve of this gentleman's policy. Individually the Americans are good fellows, but as a nation they are given to the perpetration of acts of despicable meanness, especially towards this country. Notwithstanding the tariff wall which has existed between Canada and the United States for nearly twenty years past, the Americans have found a market in the Dominion for many millions of dollars' worth of goods annually. If the men who are sent over here to sell these goods were for a time to be given the cold shoulder after the fashion described above, protests would soon find their way to Washington from the manufacturers whom these men represent, and as a result no doubt a more neighborly policy would be adopted toward this country. Let those who have been in the habit of buying from representatives of American houses, try this method of securing international fair play.

ILLUSTRATIONS.

RESIDENCE FOR MR. JAMES THOMSON, BAY AND ROBINSON STREETS, HAMILTON, ONT.—JAMES BALFOUR, ARCHITECT.

GROUP OF DELEGATES TO THE SECOND ANNUAL CONVENTION OF THE NATIONAL PLUMBERS' ASSOCIATION OF CANADA.

THE LAKESIDE HOME FOR LITTLE CHILDREN, TORONTO ISLAND.—CURRY, BAKER & CO., ARCHITECTS.

The Lakeside Home for Little Children is the convalescent branch of the Hospital for Sick Children, Toronto. It is situated at the Point Park, Toronto Island, and was erected and furnished at a cost of $40,000 by Mr. J. Ross Robertson, of the Toronto Evening Telegram. The plans were drawn by Mr. S. G. Curry, of the firm of Curry, Baker & Co. It was presented to the trustees of the hospital on the condition that the sick children of Freemasons in the jurisdiction of the Grand Lodge of Canada should receive surgical and medical treatment free in both institutions.

The Lakeside Home is about 165 feet long, three stories high, and has accommodation for 125 children, 50 nurses and other help. It is the largest and best equipped sanitarium for children in the world. The building is provided with every modern equipment—bathrooms, lavatories, gymnasium, reception rooms, parlors, committee rooms, etc. It is lighted throughout with ascetylene gas, and is the first building in Toronto to be lighted by that process. Wide verandahs surround the institution, and magnificent views of the lake are obtainable from every point.

FULFORD MAUSOLEUM, LONDON, ONT.—MOORE & HENRY, ARCHITECTS.

Mr. Robert Fulford has just completed, at Woodland Cemetery, London, Ont., a very handsome mausoleum, to the memory of his wife, the late Annie Pixley Fulford.

The building is in the centre of a large plot of ground on a slight eminence, is built of Stanstead, Que., granite throughout, and has interior walls, ceilings, catacombs, etc., of sandstone. The catacombs are situated in the basement, and are covered over by a granite floor ornamented with encaustic tiling.

The entrance is flanked by two colossal lions. The entrance gates are of solid bronze, handsomely wrought, with carved frames, and surmounted by a bronze medallion containing a group representing Charity, in bas-relief. The main arch is supported upon four columns of polished Swedish granite with carved capitals.

The front is supported at either side by massive panelled pilasters, carrying life size granite statues representing Music and Drama, while in the centre, surmounting all, is a large figure representing Victory.

The interior is lighted by three memorial windows from Innsbruck, Austria, is wainscotted in marble, and has a handsome coffered ceiling. Niches in the rear, enclosed by bronze grilles, afford room for two incinerary urns.

Messrs. Moore & Henry, architects, of London, Ont., designed the mausoleum and superintsnded its construction. The McIntosh Granite & Marble Co., of Toronto, were the contractors, and Messrs. Allward and Sturgeon, of Toronto, made a success of the sculpture. The Tyrolese Art Glass Co. executed the memorial windows, while the ornamental bronze work is from the Toronto Ornamental Iron Works.

THE LITTLE CHURCH OF ST. MARTIN.*

BY FRED. T. HODGSON.

WE have abundant evidence that during the Roman occupation of England, many primitive Christians practised their faith in that country, and there is good reason to suppose that in many parts of the country, particularly where the Roman soldiers were stationed, the followers of the cross were numerous enough to require a place to worship in. The policy of Rome, within the sphere of her influence, was one of extreme tolerance in matters of religion. This policy of tolerance enabled her to mass together in her legions all manner of creeds and nationalities, and her rule was felt less oppressive when she did not interfere with the worship of the people she conquered. The little church of St. Martin stands today in evidence of this toleration, as it has been proved beyond a doubt, that the building was first erected for a place of Christian worship and that its origin dates back to the pre-Saxon period. Without entering deeply into the subject of the presence of Christians in England during the Roman occupation, I may be allowed to make a few quotations, in order to strengthen the claims I am putting forward, that Christian churches were built as places of worship whilst the invaders remained in the country. So early a date as the year 150 A.D., is assigned by authorities whom Bede follows, for King Lucius' request to Pope Eleutherus to "make him a Christian," and this is taken as a commencement of Christianity in England. The dates given do not accord; and the existence of King Lucius at all has yet to be proved. But, on the cliffs of Dover, and within the lines of the old Roman fortifications, are the remains of a very ancient building whose outlines or plan prove it to have been a place for Christian worship, and tradition has for hundreds of years given these ruins the name of Lucius' Chapel. In the year 292 A.D., during Diocletian's reign, an old chronicler tells us that "the pious Alban was martyred and many churches were destroyed and holy men slaughtered." St. Alban was the first British martyr. He gave name to a city, and to hundreds of churches. With his death we have many monkish legends; it is said that the river Thames dried up at his approach to the place of martyrdom, and according to Gildas, although Bede's authorities are content to make the miracle occur at the stream between the city and hill of execution—a spring bursts forth from the spot—the eyes of the executioner fall out, and many other wonderful things occur. St. Athanasius, in the middle of the fourth century, speaks of British bishops being present at his trial at the Council of Sardis. Three British bishops are recorded to have been at the Council of Arles, A.D. 314. Apart from

CANTERBURY CATHEDRAL, ENGLAND—"THE SOUTH PORCH."

the many references made by Roman and native writers to the Christians in England, we also have hundreds of archaeological proofs that cannot be well contradicted. There are in the British and other museums in the country many evidences of Christianity in the shape of symbols on Roman jewelry, such as crosses, the trefoil, and many other indications of early Christian beliefs. Without going into all the reasons proving this church to be of Roman origin, I may state that when the Saxon King of Kent, Ethelbert, took his French bride, the gentle Bertha, to his Saxon home, about the year 590, she found many of her co-religionists there. It is on record that before leaving her French home, she had stipulated in the marriage agreement that she be permitted to practice her own faith, and that she take with her to her new home her Bishop and Confessor. Ethelbert, who, though a pagan, was a reasonable man, granted all she desired and placed at her disposal a little church, which at one time had been used for pagan worship, but now served as a Christian church. Quoting a well known passage in the Venerable Bede's Ecclesiastical History,—"There was on the east side of the city a church dedicated to the honor of St. Martin, built whilst the Romans were still in the Island, wherein the queen, who, as has been said before, was a Christian, used to pray." As Bede is one of the most reliable of early Christian writers, we may take it for granted that the church was ancient, when Bertha and her Bishop Luidhard offered up prayer under its roof. As it has ever since, even unto this day, been used as a church, it holds the proud position of having Christian service held within its walls for over thirteen hundred years, a distinction no other Christian church in existence can claim, for none exist in Rome, and only two in Constantinople,—St. Sophia and St. Barrabas—but which have been used for over four hundred years as mosques of Mahomet.

*A paper read before the Collingwood Fortnightly Club.

† The paper was illustrated by lime-light views of the Church of St. Martin, and of the great cathedral.

While it is not known that Bertha or her bishop held any communication with the See of Rome, it is not unreasonable to suppose that such was then the case, for it is quite evident she had prepared the King for the events which happened during the next few years.

Early in the spring of 597, Augustine with 40 followers, sent by Gregory the Great, Bishop of Rome, landed near Canterbury and held audience with the king, who permitted the strangers to go inland to the town, and promised to consider the new devotions they taught. Through the influence of Bertha, the king accepted the new faith and on Whitsunday, the 2nd of June, 597, Ethelbert was baptized, the ceremony taking place in the church of St. Martin, and the holy water used for the purpose being taken out of the font now in the Church of St. Martin. The antiquity of this font is verified by the character of its ornamentation, as well as by tradition and historical reference. Its age dates back some 250 years before Bertha's time, making it over 1,500 years old. This little Church of St. Martin has not only the proud distinction of being the oldest Christian building in Europe, but it is the only church in existence in which a king was baptized during the sixth century. It is also the mother of all those noble ecclesiastical buildings that dot the British Islands, including the great Cathedral of Canterbury, which will be the main topic of this paper.

Land was granted Augustine and his followers in the city of Canterbury, embracing the spot where the cathedral now stands, and where stood at that time a Pagan temple that had once been a place of Christian worship, for Bede tells us that St. Augustine (A.D. 602), "being supported by the king, recovered at Canterbury a church which had been built by the ancient Roman Christians, and consecrated it in the name of our Holy Saviour, God and Lord Jesus Christ, and there established a residence for himself and his successors," and we are further informed that "Augustine added to and rebuilt the place and made of it the headquarters of Christianity in England," and a portion of the original building still exists in the crypt, showing plainly Roman construction and Roman materials; there is also existing in the cathedral the chair, or throne, of marble, said to have been taken from Rome purposely for Augustine, and called "St. Augustine's Chair," and though it may not have been placed in the cathedral during the first archbishop's time, it no doubt represents the ancient episcopal throne on which the bishop of that time sat with all his clergy around him. When the new church was completed, Augustine rededicated it and called it "Christ Church," a name that it still bears. Once settled, more clergy were sent from Rome, and it was not long before all the people of the kingdom of Kent ~~were~~ professing Christians. With regard to this it may not be out of place to make a short quotation from "Green's History of the English People."—"Canterbury, the earliest royal city of German England, became a centre of Latin influence. The Roman tongue became again one of the tongues of Britain, the language of its worship, its correspondence, its literature. But more than the tongue of Rome returned with Augustine. Practically his landing renewed that union with the western world which the landing of Hengest had destroyed. The new England was admitted into the older commonwealth of nations. The civilization, art, letters which had fled before the sword of the English conquerors returned with the Christian faith."

Augustine died in 604, and was succeeded by Lawrence, who does not appear as a very striking figure. It is not my intention to give a list of those who followed Augustine, further than to mention those who acquired distinction, or who added, by their skill, to the magnificent pile I will illustrate. I may say, however, that the first six archbishops were of Roman birth, but the seventh, Trithona, was an Anglo-Saxon, who was noted for his learning and piety; and from this time until the advent of the Normans the church was ruled altogether by native archbishops.

Odo was made archbishop in 938, and found the church very much in want of repairs, which he undertook and completed. The great Dunstan, the father of many English industries, followed. This Dunstan was rather a noted character—he not only ruled in the church, but he ruled in the State also. He taught his people to work in gold and silver, wood and clay, and was himself an artistic blacksmith, and many quaint and weird legends are told of him. He is said to have been on speaking terms with the Devil, but to have always beaten him when discussing theological questions. One day, in the heat of a controversy, he lost his temper, and jagged his Satantic Majesty in the ribs with a hot iron; that gentleman flew away in disgust, and has never since visited Canterbury. In 1011 the Danes made an invasion of the the city, burned the cathedral, and on the 19th of April of that year, murdered Archbishop Alphage. King Canute, feeling remorse for both acts, restored the building, granted money for its maintenance, and gave his golden crown, which the monks retained until the Dissolution. Within a few months of the conquest by the Normans, a fire again ravaged the city, which then surpassed London in wealth, extent and importance, and the cathedral was again destroyed, all but the bare walls.

With the Normans came a class of men whose architectural ability and constructive skill were far superior to those of their predecessors. Lanfranc, a name ever to be remembered by British architects, was made Archbishop of Canterbury in 1070, and finding the cathedral in a ruinous state, pulled down a goodly portion of the building, and began its re-erection with arches of a bolder sweep and columns of more elegant proportion. The work was carried on under the direction of Prior Conrad, an architect as well as a prelate, and a man of more than ordinary ability. On the death of Lafranc, Anselm, a very learned theologian, and better known as St. Anselm, was made archbishop. He continued the work, the grandeur of which seems to have excited

the wonder of his contemporaries. "Nothing similar," writes William of Malmsbury, "was to be found in England, either for the brilliancy of the painted windows, the splendor of the marble pavement, or the pictured walls which attracted the eyes of the beholders." The cathedral was re-dedicated to Jesus Christ, on its completion in 1114, by Archbishop Rudulfus. Henry of England, David of Scotland, and every bishop of the realm were present, "the ceremony being the most famous that had ever been heard of on earth, since that of the temple of Solomon."

In 1162 the first Englishman since the Norman conquest was made archbishop and primate of all England. This was Thomas a Beckett, who became, after death, the most famous intercessor in the Christian church. He was made archbishop through the efforts of Henry II, who thought to make of him a tool, to be used for his own purposes when treating with Rome; the King found in him, however, anything but a pliant tool. For several years the archbishop bearded the King, until, in an outburst of anger, the latter exclaimed, "Will no one rid me of this stubborn priest." As a result of this expression the archbishop was murdered in the church on the 27th of December, 1170. In a year after the assassination the cathedral was desecrated, the bells were fastened up, the pavements torn up, the hangings and pictures removed, and dirt and rubbish suffered to accumulate. The re-consecration of the church, after so memorable an event, led the way to an influx of benefactions and honors, strongly characteristic of the superstitions of the age and of the influence of the priests. The recorded lists of treasures which flowed in upon the death of the archbishop after the church had declared him a martyr in the cause of its dominion, are admirable testimonies of its fame. On the 5th of September, 1174, the choir and other parts of the church were consumed by fire, and the greater portion of the woodwork in the roof was destroyed. In 1175 and 1180, Richards being the archbishop, the whole was rebuilt and improved under the superintendence of William of Sens, who, it seems, had been brought from France for that purpose. Mr. William of Sens borrowed largely from the Cathedral of Sens, for nearly all the work of his left us in Canterbury is simply a reproduction of work in his own town. Fortunately for the cathedral, but unfortunately for himself, he fell from a scaffold and was disabled before the work was half done, and the work fell to the lot of an Englishman—another William, and of whom the chroniclers say "was small in body, lofty in mind, astute in workmanship and honest," qualities that did not seem to obtain to any large extent among the Normans. At this point I am offered an opportunity to descant on the artistic beauties of this, one of the most noted cathedrals in Europe, for be it remembered, that until Thomas Beckett, the murdered Anglo-Saxon priest, was made a martyr and became the foremost saint in the Roman calendar, St. Dunstan was the saint that took the cake for working all sorts of impossible things, and curing free of charge all kinds of unnameable diseases. Both St. Thomas and St. Dunstan were archbishops of Canterbury, both saints were Anglo-Saxons, and both saints had shewed their utter disregard of kingship, while the Norman archbishop, St. Anselm, was noted for his unquestionable faith, his learning, and his humble submission to the king and pope. I admire the latter saint for his learning and his desire to better the condition of his fellows by teaching them to take things as they came, and for his devotion to his church and his love of art. I love Dunstan for his fearless independence, his indifference to the doctrine of divine kingship, and his efforts to benefit his fellow men by teaching them the industrial arts so as to enable them to wrestle with the problems of the earth, rather than to waste their existence dreaming of the unknowable. If I had my way in the matter, it should be St. Dunstan of England, hammering at the forge, rather than the mythical St. George, killing an animal that never existed, that should be the royal arms of England. As to St. Thomas, he was of the rugged bull-dog type. He loved a fight and never counted on, or feared the consequences. If he had not quarreled with Henry the 2nd, he would have had a tussle with the Pope, and like Henry, the Pope in all probability would have come out second best. Thomas' piety hung pretty loosely upon him, though the monkish writers have built a wall of sanctity around his memory, while history and facts give us such an insight into his character as to lead us to believe that all his ideas regarding religion were of the crudest sort, and led him to mistake wealth and power for religion.

Since William the Anglo-Saxon finished his work in 1180, the Cathedral has not been greatly enlarged, though some additions and many improvements in the interim have been made; the tower has been completed, and the south porch added, so that dimensions now are nearly about as in 1180.

Rome, watching the trend of events, and knowing pretty nearly what kind of a man King Henry was, made the murdered Archbishop a Saint, and appointed a day—St. Thomas' day—which is still kept, ordered Henry to make atonement for his sinfulness in suggesting the murder of so good a man as Becket. Henry made a pilgrimage to the tomb in sackcloth and allowed himself to be pounded by the priests until he fainted—the fool—and by this means became reconciled to the church. To this incident we are indebted for that masterpiece of poetic art, "The Canterbury Pilgrims," by quaint and loveable old Chaucer. I can forgive Henry for his pusillanimous submission, because of its being the means of giving us those beautiful productions by the Father of English poetry.

Under direction of the Pope, with the consent of Henry the 3rd, Cardinal Langdon caused a costly shrine to be built in honor of the saint, and the removal or translation of the remains took place on the 7th of July, 1220. This ceremony took place in the presence of Henry the 3rd, the Cardinal and a number of foreign prelates. The expense attending this ceremony was immense, the Cardinal having provided refreshments, with provender for horses, along the road from London, for all who chose to attend. Conduits were dispersed about the city of Canterbury, which ran with wine, and nothing was wanting to give full effect to the triumph of priestly power. The festival of the Translation of St. Thomas became an anniversary of the highest splendor, and to this day it is observed in many of the Roman churches on the continent. I may say also, that for two centuries after the murder nearly every church built in Europe was dedicated to our own Anglo-Saxon bull-dog, St. Thomas a Becket.

(To be Continued.)

Mr. N. H. Bradley, architect, 18 King Street East, Toronto, was recently married to Miss N. Corner.

STUDENTS' DEPARTMENT.

ADVICE TO STUDENTS OF ARCHITECTURE.

THE following remarks by the president of the R. I. B. A. are as applicable to Canadian as to British students:—No teaching will give genius or parts to learners, but I think I may say, without fear of contradiction, that untiring diligence is an absolutely necessary qualification, and this has been so evident to those who possess genius, that Buffon defined it "as the art of taking trouble," which we all know it is not; but diligence is so absolutely necessary for the development of genius, that it is excusable to confuse the necessary servant with the master.

Necessary as an indefatigable diligence is, the longest life is only too short for the attainment of even a competent knowledge in the master art we profess, which embraces so many various arts, and requires a knowledge so wide and so various, and qualities of mind that are rarely found in one person. It is a great saving of time to have a map, a compass, and a knowledge of the streams and currents, of the reefs and sandbanks, before we embark; not only to prevent shipwreck, but also to avoid deviation from our course, so that there may be no waste of labor, however strong and indefatigable we may be. Some of the wiseacres of the last century, during a dearth, employed laborers to dig holes in the ground and fill them up again, and although this kept the laborers' muscles in training and prevented the loss of habits of diligence, the crop that should have resulted and rewarded the laborers for their exertions was non-existent; nothing is more disheartening than useless labor. Many of my own early years were wasted in inking in drawings, and I could not help wishing at the time that I had been a shoemaker, for stitching shoes could not be more irksome, and would have prevented some people from getting their feet wet or worn. The creation of something useful would have mentally compensated me for the irksome labor, while no one was benefitted by my inking in drawings.

The wisest saying of the Delphic oracle was, "Know thyself," and it can be as usefully applied to themselves by those who study architecture as by others in the various exigencies of human life. It is obvious that if one knows oneself one can best choose the part of architecture most fitted to one's aptitudes, and one can map out those parts that are essential to be learnt; by this means not only is much useless labor saved, but that worst of all shipwrecks is averted, the having embraced a profession that is not congenial, and for which one finds one's capacities are not fitted, and this, too, when it seems too late to throw up the profession. I recollect hearing a pupil of Laing's—The Laing who built the Custom House—who found architecture so uncongenial that he embraced the law, and became a Vice-Chancellor; as Alfieri the barrister became a celebrated architect. It is within the knowledge of most men that many of those who have become distinguished have changed their profession; but these men have mostly had a natural aptitude for the subject they eventually embraced and excelled in.

To those unfortunates who have embraced architecture but have no aptitude for it—nor, as far as they know, for anything else—I can only recommend the behaviour of Scotchmen under the circumstances. I think I may say that Scotchmen are the only people of the United Kingdom who have a good education, and by this I mean a moral education; each man who finds himself in this position says to himself "this is my only chance in life; I have no natural aptitude for it, but I must try by application and striving in season and out of season to make up for my lack of aptitude;" and you rarely find that they fail in whatever walk of life they have embraced, for they mostly gain a good position.

Youth is naturally enthusiastic and ambitious, and would fain know everything connected with its occupation. Most students have probably read Bacon's programme of mastering all human knowledge; but we are not all Bacons, and had Bacon lived now, when the memory wanted for one branch of science is greater than that given to most men, he would never have set out on so impossible a quest.

A student, for example, has to see what a column or stanchion will safely bear; and so he wants to know the laws of flexure, and finds himself referred to Poisson; he gets Poisson's book, but finds that to understand it he must master the different calculus; he gets a treatise on that, but finds it would take him his whole life, if he could learn it then; yet as the multiplication table is to arithmetic, so is the different calculus to the higher branches of mathematics; he therefore comes to the old conclusion "that everybody cannot do everything."

It is, perhaps, a laudable ambition to take one of the great architectural geniuses as a pattern, but you should have common sense enough to calmly and dispassionately review your own powers and capacities before entering on a serious attempt at imitating his achievements. There is only one genius in several millions of people who is blessed with the capacities of the great architects, who has the making of a Brunellesco, an Alberti, a Peruzzi, a Bramante, a Leonardo, or a Wren, and I only wish more of those who find themselves incompetent would abandon the profession. The average capacity of mankind is not great, and yet each one wishes to be the bright particular star of the world. Each unit of mankind cannot endure the idea that his capacity is not equal to that of the greatest genius; but he will admit that he is deficient in industry, and in that judgment which guides a man to concentrate himself on the principal aim of his life. This shows us one of the weaknesses of humanity, to be ashamed of admitting that which is a pure accident, over which we have no control; and to admit, without blushing, our neglect of those things that are in our power. It is the fashion to encourage the belief that all men are born with equal capacities, as it is to suppose that every epoch is equal in mental and moral power, and that the difference depends on teaching, as if cutting and polishing a flint stone would turn it into a diamond. I recollect Roebuck talking this sort of nonsense at Sheffield, and after pointing out what John Stuart Mill could do at thirteen years of age, who had then mastered Greek, Latin and mathematics, he said:—"But if John Mill could do what he described, why may not John Brown do as much, or nearly as much?"

The subjects that seem to me to be of the utmost importance are—firstly, the recognition by students and their teachers that architecture is a structural art, and that until that is realized and acted on no great improvement is likely to take place. All the materials we use have weight, and in their ultimate position have size too, and in the positions they are placed have, as well as downright pressure, cross and diagonal strains. All these strains occur in almost every building, and must balance one another, or else the building becomes deformed or ruined, or tumbles down. The theory of the strains that produce equilibrium are called statics. The architect with the keenest observation, the strongest memory, and the greatest experience is a mere child, compared with one who is a masters of statics and the strength of materials; secondly, we all admit that without proportion buildings and their parts are unsightly, and we endeavor to train the eye to good proportions by studying classical buildings; their proportions, however, mainly give the statical results gained by experience at the time the buildings were erected; if these studies are pursued too long they are apt to make us fall in love with a state of knowledge inferior to that which we now possess.

That friend of our youth, Mr. Ruskin, partially enlightened us on this subject by pointing out the infinite variety of proportions in nature, most of which we find agreeable to the eye, and we now know that what may be called the fundamental proportions depend on the weight to be carried, the strength of the material, and its height and size. Statics allow us to go further, for, knowing the strains to be borne, and where they come, and the strength and peculiarities of the material, we may mould it into various forms, either by cutting away useless parts, or by adding to the bulk in certain directions. By statics we know where there is a change of function, and where various strains are concentrated, and these parts call for some expression, and the only way of expressing them architecturally is by moulding.

The proper arrangement of each chamber for the duties it has to perform, the collocation of the different chambers, and the access to them by means of halls or passages without unnecessary waste of room, is commonly denoted by the word "planning," and in reality it includes much more, as, for instance, their proper lighting, aeration, ventilation, and warming; in fact, the enabling us to make the different portions fulfil their ends is the foundation of all good architecture. But man wants more than this; he wants not only certain parts to be more striking than others, but to make the whole have such an external appearance that it tells us the use of the building and evokes the emotions proper to its use. All we have to deal with outside are walls and roofs, but we may want porticoes and porches, towers, lanterns, spires, and domes for certain uses and under certain circumstances.

Inside we have much the same elements, but we have as well, floors, ceilings, and staircases, and although we always want floors to be flat, there are circumstances where steps are required to give elevation and dignity to certain parts, and there are also certain shapes which add beauty or dignity to the rooms,

and if the ceiling is vaulted or domed we may want it made striking or beautiful.

One particular point is usually missed in speaking of architecture—the skill in combining the junctions between forms of diverse or opposed shapes, and of marking the different changes of function where they occur, or of marking the concentration of strains. These, as I mentioned before, are accomplished by mouldings, and these mouldings are to give us varieties of light and shade, and to have a sort of logical sequence in their forms. The Greeks were the first and the greatest masters of mouldings, which were, of course, shaped to be played on by brilliant sunshine and in a clear air. The Roman mouldings were only badly-designed Greek ones with infinitely less variation. The second masters of moulding were the Gothic architects, who designed them for the misty climates and feeble sunshine of the countries they lived in. They were as logical as the Greeks, though destitute of their refined artistic sensibilities; and since then the study of profiling has been abandoned.

I say nothing of sculpture, in which I include naturalistic as well as vegetable and animal forms, for this is another art; but it must be exercised with due regard to the architecture, and must neither be incongruous nor destroy the scale of the part, the chamber or the building. You cannot expect sculpture from architects, as it takes the life study of an artist, and architecture alone may be said to embrace the life studies of many men—men of science, men of ingenuity, and men of art. When, however, the architect is so transcendent a genius that he can master his own art and that of another artist, he excites our wonder and our admiration; but to be a bad architect and an execrable sculptor too is not a combination to be admired, and still less to be proud of. It merely entitles the possessor to Martial's compliment, who called the amateur who did so many things a great meddler.

There are one or two more points that I must mention, but perhaps the influence of the age is the most important; this in one direction is what we call the taste of the nation, and it inevitably modifies the individual taste of the artist. The old proverb says, "The mind of man is greedy of novelty," and novelty in itself has, no doubt, a certain charm, but it should only be that difference from what has gone before which must inevitably follow from those thousands of things, circumstances and temperaments that distinguish one age from another. It shows us too, how ridiculous antiquarianism is when it takes the place of architecture. We are not Greeks, Romans nor Byzantines; our age is not Romanesque, nor Gothic, nor Renaissance, and if the architecture of the day is to charm the age it must discover and embody the desires of the age. The paraphrasing of deceased styles only charms us in so far as our civilization approaches that of the date of the building paraphrased, and the building wants novelty too. We naturally do not admire Gothic paraphrases, as the desires of those times are so far removed from our own inclinations. The Gothic architects' passion for geometry is very far from being ours.

Architects can but slightly modify the desires of an age, as there are so many thousand things, conditions and influences that combine to mould public taste. All they can do is to have the attainable knowledge and skill required for their art, and if invention in architecture is extinct we must try to recreate it. I hope it is not extinct, but if it be we still have the mountains, rocks, and peaks, the caverns and grottoes, the woods, the trees, and the plains, the rivers and seas, the clouds and the heavens, to stimulate us to embody the lessons we can learn from these natural effects; not to speak of the lessons we can learn from the past architectures of the world. I cannot help thinking that if the born architect should arise and be single-eyed in his devotion to this grand art we might hope to see it again flourishing, as in the grand epochs of the past. Antiquarianism is not content with gnawing out the vitals of architecture, but is destroying our faith in its being still alive.

Another of the points that wants attending to is the study of the means employed by the great architects of the world to evoke the emotions proper to the use of buildings, and particularly to those dedicated to the adoration of the Almighty. Students are naturally apt to seize upon features that they admire and use them in the most incongruous way, as if the adornment of a temple or a palace were appropriate to a laborer's cottage, a coal store or a tailor's shop, whose owner makes the human form divine ludicrous and ignoble. Elegant simplicity of appearance should be the architect's aim for most of his buildings, as his aim should be to produce horror and repulsion in a prison.

Our great object now is to be sure that we have done our best to learn all that we ought to learn. How delightful it would be if we were as sure of our progress as were the Gothic architects, and instead of being as careful of every scrap left by a semi-barbarous age, as if it had come from Heaven, and were sacred, we could use with a light heart a good stone, as they did, for our own work, and build in their worked part which we have surpassed. I may say this was not confined to Gothic days; the Greeks used the sculpture they had surpassed for filling in holes and trenches, and Mr. Purdon Clark showed me a Saracen wood block that had once formed a door-head in a destroyed mosque, the back of which had been used for the work of the day, while the carved part, worked in a former age, had been built in.

BUILDING COVENANTS.

BUILDING covenants are inserted in building agreements, leases and conveyances with the object of providing for the building of houses of prescribed description and value, restricting users of the land in prescribed manner, the making of roads, sewers, drains, and other similar objects, says the Contract Journal. Although the vendor propose to sell the whole of his land absolutely, yet if he does so in several lots it will be important to insert restrictive covenants to prevent the land being used for purposes other than those for which it is sold, for otherwise some lots may be used in such a way as to decrease the value of the remaining lots.

A covenant by a person to build such a house as he should think fit binds him to nothing, as a promise cannot be conditional on the mere will of the promiser. Where a lessee covenanted to repair buildings comprised in the lease, and, further, within the first fifty years of the lease to take down the demised messuages as occasion might require, and in their place erect not less than four other good and substantial brick messuages, it was held that, if the lessor had the original houses substantially as good as new in the course of fifty years by being repaired, the covenant would be satisfied, and the lessee need not actually rebuild (Evelyn v. Raddish, 7 Taunt., 411). But where certain premises in a state of dilapidation were demised, and the lessee covenanted to new build the brick houses within three years, he must rebuild the whole, it was held that making extensive repairs by pulling down and rebuilding the fore and back fronts was not a performance of the covenant (city of London v. Nash, 3 Atk., 512). A covenant entered into by the owner of certain land with a purchaser that an adjoining plot "should never be hereafter sold but left for the common benefit of both parties and their successors," is enforceable, and does not contravene any rule of law (McLean v. McRay L.R. 5 P.C. 327). When land is sold in lots, and there are mutual restrictive covenants by the purchasers that the land shall not be used so as to create a nuisance to the original vendor, or the occupiers or proprietors for the time being of the "adjoining" property, the word "adjoining" means the property adjoining each lot, and not merely the property adjoining the whole piece of land originally sold; and the owner of any lots is entitled to enforce the covenant against the owner of any other lot. By reason of the doctrine that a conveyance of land impliedly also includes the subsoil of an adjoining street "even to the middle of the way" houses on the opposite side of the road may be within a covenant relating to premises "adjoining or contiguous" (Haynes v. King, 1893, 3, Ch. 439). A covenant for "the free use of the newly intended road whenever the same may be made," will not apply to a road which, when the parties contracted, was newly intended to be made, but was executed and complete before the sealing of the deed (Crisp v. Price, 5 Taunt., 548). Land having been laid out for building, and streets projected across it, the defendant bought one plot with a right of way over the projected streets, the vendors reserving a similar privilege over the street in front of the plot sold; and the defendant covenanted with the vendors that he would not erect any building on the plot within the distance of six feet from the intended streets. It was held in the case Child v. Douglas (1 Ray, 560) that a subsequent purchaser of a neighboring portion of the land might obtain an injunction against the first purchaser to restrain him from infringing his covenant, and this whether the plaintiff at the time of his purchase knew of the existence of the defendant's covenant or not, as the plaintiff must be taken to have bought all the rights connected with this portion of the land, especially if he has bound himself by a similar covenant. An owner of building ground upon which the houses of uniform height and depth had been built sold it in plots, and conveyed each plot in fee, subject to a perpetual rent charge, and each purchaser covenanted with the grantor that there should be no trees or any building whatever in the garden that should exceed the level of the parlour floor; it was held (Western v. McDermitt, 2

L.R., Ch. 72) that it was a breach of covenant to erect any building above the prescribed height extending beyond the back of the house, though the ground upon which it was built was never used as a garden. Where a covenant was that "no buildings" except dwelling-houses not to cost more than £200 each to front with the road should be erected on certain land, and the defendant, having thrown the land into pleasure ground, built a garden wall alongside the road eight feet six inches high, and in one part eleven feet high, behind which part he also erected a vinery with a roof leaning against the wall; it was held (Bowes v. Law, L.R., 9, Eq. 636) that the building of the wall to the height of eight feet six inches was not a breach of covenant, but that the building of the wall to the height of eleven feet and the erection of the vinery were breaches of the covenant. The erection of wooden hoardings for the purpose of advertisement, fastened to the premises, is a breach of covenant not "to erect or make any building or erection on any part of the demised premises." But the erection of an advertisement hoarding is not a breach of a covenant that any "building" which should be erected on the land should be of a certain height and have a stuccoed front and slated roof, and be used only as a dwelling-house (Foster v. Fraser, [1893], 3, Ch. 158). A covenant in the purchase deed of a house in a terrace that no building shall be erected on any part of the land of the vendor lying on the other side of the terrace, and opposite to the plot of land thereby conveyed, applies only to the part of the land which is immediately opposite to, and is the width of the plot conveyed. The right to a prospect can be acquired only by grant or covenant, and not by prescription. Where a lessor, pending an agreement for a building lease, represented to the intended lessee that he could not obstruct the sea view from the houses to be built by the lessee, pursuant to the proposed lease, because he himself was a lessee under a lease of 999 years, containing covenants which restricted him from so doing; but after the building lease had been taken, and the houses built upon the faith of this representation, the lessor surrendered his 999 years' lease, and took a new lease, omitting the restrictive covenants, the Court restrained him, by injunction, from building so as to obstruct the sea view.

A covenant by the lessee to "rebuild" a house on the site of the demised messuage, which he covenants to pull down, involves no obligation to build a new house in the same manner, style, and shape, or with the same elevation, as the old building. If it is intended, therefore, that the house should be rebuilt in the same style, the covenant should be so framed as to clearly express this agreement. Bay windows carried from the foundation to the roof, and projecting three feet beyond the line of existing houses are a breach of covenant not to erect any "building" nearer to the road than the line of frontage of the then present houses in that road, and to observe the straight line of frontage with the line of the houses. Where, at the date of the covenant, the houses were already built, and the covenant prohibited any trees or buildings whatsoever in the garden exceeding a certain height, it was held that "garden" meant the whole space from the back wall of the house to the extremity of the plot, although not used as a garden, and that a bow of eight feet at the rear of the house, and above the prohibited height, was a violation of the covenant. If building land is to be laid out with private residences, a covenant is inserted to restrain the lessee from erecting any buildings on the premises to be used for carrying on trades or businesses generally or to particular businesses. A covenant restrictive of the user of premises is not void as being in restraint of trade; such a covenant in a lease runs with the land. A covenant not to carry on any trade, business, or calling in a house, or to otherwise use or suffer to be used, to the annoyance, nuisance, or injury of any of the houses of the estate, is broken by carrying on a girl's school, and the covenantee does not waive the benefit of the covenant though he has permitted other houses held under the like covenant to be used as schools (Kemp v. Sober 1 Sim. N.S. 516; Johnstone v. Hall, 2 C. and J. 414). The object of the covenant, sometimes, is to restrain the erection of buildings for the purpose of carrying on certain specified trades and businesses only, and in such cases questions may arise as to whether a particular trade is within the meaning of the covenant. Such a prohibition goes only to those trades or businesses which are actually specified, and implies that other trades may be carried on. The test whether a covenant not to carry on a "similar business" to that of the lessor has or has not been broken, is whether the one business is sufficiently like the other to compete with it. A covenant that land should not be used "as a site for any hotel, tavern, public-house, or beerhouse," nor "should the trade or calling of an hotel or tavern keeper, publican, or beershop keeper, or seller by retail of wine, beer, spirits, or spirituous liquors" be "used, exercised, or carried on at or upon" the same is not broken by the sale of wines and liquors in bottle by a grocer in the course of his trade. Nor is a covenant not to use premises as a public-house, inn, tavern, or beershop, or for the sale of wine and liquor, broken by the sale to members of a club for the benefit of the club held on the premises. Nor, apparently, by the user as a private hotel—i.e. by sale only to guests and travellers staying at the hotel. But a covenant to use the premises "as and for offices, and the storage of wines and liquors only," is broken by selling wine by the glass; and a covenant not to permit any house to be used as a beershop or public-house is broken by the sale of beer in the shop, in pursuance of an Excise retail of beer to be consumed off the premises.

If the covenant provide against the exercise of certain trades or businesses, specifying them, "or any other offensive trade," omitting the words "or business," the Court will not extend to the word "trade" in the latter part of the sentence the meaning of the word "business" in the former part; but will treat the word "trade" as applicable to the dealing by buying and selling only, for every business is not a trade, though every trade is a business. In some cases there is only a general covenant, which is so framed as to restrain the erection of houses and buildings for the exercise of offensive trades or businesses, or to prohibit occupations which may be a nuisance or annoyance to the other tenants of the lessor; and in construing such covenants much will depend on the situation of the premises and the particular circumstances of each case. The word "nuisance" in a covenant is sufficient to prevent an act causing annoyance only. "Annoyance" and "grievance" are wider terms than nuisance, and include anything that will disturb the reasonable peace of mind and pleasure of an ordinary sensible person, although it do not amount to physical detriment to comfort. Where the covenant prohibits the erection of buildings for the exercise of trades which may grow to the annoyance or damage of the lessor, etc., without his written license, the mere fact of the lessor's suffering the tenant to carry on one trade will not, afterwards, authorize the carrying on of another without his written license.

In framing covenants against nuisances and trade in building leases, it should be observed that the omission of the words "offensive trade, business, or occupation" may be of very great importance to the lessor, having regard to the liability of the owner or occupier of land both at law and in equity in respect of nuisances committed, or caused, by those whom he brings on the land, or at any rate where he licenses the acts causing the nuisance. The landlord may not be liable where a nuisance is caused by the act of a tenant, yet if the act is one expressly contemplated in and authorised by the lease, the landlord may be liable for any injury caused thereby, although the tenant, if sued, might have no defence to the action.

Lands were conveyed to A for the purpose of erecting villas upon them. By the conveyance parts were allotted for roads, and it provided that the owners and occupiers of the villas should at all times have a full and complete right of road or passage over, along, and upon the same, in as absolute a mode of enjoyment as if the same were public roads; and A entered into a covenant to that effect. Villas were built upon the land, and let to several persons. Some of the lesses, without the consent of the others, requested a gas company to open up the roads and lay down pipes for the supply of gas to their villas, which the company accordingly proceeded to do. On a bill by the devisees of A for an injunction to restrain the company from so doing, it was held that whether the roads were public or private, the devisees were bound by his covenant, and that the occupiers of the villas were entitled to have gas laid on to their houses (Selby v. Crystal Palace District Gas Company, 31 L. J., Ch. 595).

PERSONAL.

Messrs. Dick & Wickson, architects, Toronto, have removed from the Canada Life Building to No. 26 Bank of Commerce building.

Messrs. Curry, Baker & Co., architects and heating engineers, Toronto, have removed from Victoria street to 90 Yonge street, where they have a nice suite of offices well adapted for their purposes.

Mr. Chas. Baillarge, Architect and C. E., Quebec, presented to Section II of the Royal Society of Canada, at its meeting in Halifax, N.S., in June, papers on "How Best to Learn to Speak or Teach a Language," and "The Abstract and Concrete in Education."

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Outside Boarding. OUR neighbors to the south have a better way of boarding the outside of their baloon frames than is generally practiced on this side of the line. As a rule, stuff fairly seasoned is used, and instead of placing the boards on the wall horizontally, as is the common practice with us, they are nailed on diagonally, at about an angle of 45 degrees, reversing the angle on the different sides. This method has the effect of making the frame very much stiffer and rigid than when the boards are nailed on horizontally. Of course, the boards, to serve their best at stiffening the building, should be laid on the building with their joints close together and well nailed to each and every stud. A house boarded this way inside and out, with the order of the direction of boarding reversed, and the work fairly well done, will never budge in itself. It cannot be blown to pieces nor shaken by the wind. It may be blown over like a dry-goods box under heavy wind pressure, but such a thing as being torn to fragments would be out of the question. If the house is intended to be veneered with bricks, the necessity of boarding diagonally is much greater than if it is intended to be sided or rough cast, as the wind pressure on the roof and gables is apt to cause a movement in the framework, which would act detrimentally to the brickwork, cracking the walls and causing other serious defects. If the house is to be rough-cast, the boarding should by all means be nailed on diagonally, and the lathing also should be put on the same way, only in reverse order to the boarding. The cause of cracks and breaks in rough-cast houses is because the frames have not been made rigid enough, or because the foundation was not sufficient and has settled, or because the material was unseasoned and shrinkage resulted. A rough-cast surface on a stiff frame will last a lifetime.

Seating Space. IT often happens that a country contractor is called upon to make a rough sketch for a rural school, church or hall, and he is instructed to design the building to accommodate a given number of persons, and in order to construct his building to the proper dimensions to meet the requirement, a knowledge of the space required by a single person to be comfortably seated will be requisite. There is no general rule in universal practice that covers this question. Boards of education, architects, chairmen of church boards and others, in this and other countries, have endeavored to formulate certain dimensions to be used for each individual present in a hall, church or school, but, from some cause or other, unanimity of figures seems impossible. Generally, the following figures will be found to answer all ordinary conditions: For halls, allow 18 inches frontage and 24 inches depth. This gives ample room, and in cases of emergency could be reduced to 15 x 20 inches, but this would necessitate some crowding. Of course, a great deal depends on the style of seat used. If orchestra chairs are used the space may be reduced somewhat, but if the old-time wooden seats, benches or pews are provided, then the full dimensions of 18 x 24 inches should be maintained. Desks used for scholars in the public schools should be, for two scholars, 3 feet 10 inches long, with a seat the same length. Here it will be seen that a new condition arises—desk room as well as seating room will have to be provided for, and to give the greatest amount of comfort and allow for passage ways between desks, each scholar will require a space of 33 x 33 inches. Seats for scholars five years of age should be 9½ inches high; ten years of age, 13¼ inches high; fifteen years of age, 15½ inches high; over 15 years of age, 16¼ inches high. Besides the space allotted for an audience, congregation or scholars, ample provision should be made for a platform, on which will be situated pulpit, reading desk, choir stand or other necessary furniture, according to the uses for which the building is intended. A little study of the foregoing will enable the country contractor to strike very nearly the size of the building required.

Seasoned Lumber. ALL country contractors should, wherever possible, keep a stock of well-seasoned stuff always on hand. A few thousand feet of fairly good inch lumber kept in stock and well piled will not only come in handy, but will be a good standing advertisement for the contractor. Everybody knows that good lasting work can not be made with lumber or timber that is only half seasoned, or not seasoned at all, and the contractor that can say to his intended client, "I have all the stuff in my yard stacked up that will be required to build your house," stands a much better show of getting the work, and getting a better price for it, than the man who has to go to the mill and order his stuff to be cut from the green logs. This not only applies to planks and boards; it is equally applicable to joists, studding and rafters. It is just as important to the fixedness of work, that the joists and studding should be well seasoned, as that the doors, flooring, sashes and wainscot should be formed of good dry material. The shrinking of joists is often the source of much trouble, as all the floors, from attic to main floor, settle down to meet the changed conditions, causing doors to bind at either top or bottom, changing the relationship of locks and keepers, breaking plaster at angles of walls or cracking it over doorways, dropping wainscot and base-boards on partitions below wainscot and base-boards on side walls, and generally wrenching the whole interior of the house out of shape. If the lower joists shrink a half inch, the partitions and the centre of the next floor drop to meet the shrinkage; then if the joists in the second floor shrink in the same proportion, the displacement in the second floor will be something very disagreeable, as many a householder has experienced. Joists, well piled, and held over for a year, shrink but very little afterwards, and their value during the year will have increased much more than the interest on their first cost and the cost of piling and extra handling. The reputation of many a good builder has been ruined because of his being obliged to make use of unseasoned materials. A few dollars judiciously invested in a good assortment of lumber will always return to the investor a solid remuneration for his outlay.

Fences. THE picket fence is rapidly passing away so far as cities and towns are concerned, as iron and stone and bricks, in one shape or another, have almost superseded it. In village or country, however, the wooden fence still holds its own, and the house-builder in these places has frequently to wrestle with the wooden fence post and the multi-formed picket. Much has been written as to the proper way to put a fence post in the ground so as to get the longest period of usefulness from it. Our experience is that a post inserted in the ground with its top end of growth down will last from 15 to 20 per cent. longer than if put into the ground with the butt down. There are good reasons for this, but it would take up too much space to give them; one reason, however, may answer for the others—timber and branches of trees all grow upwards out of the main body, and the grain of the wood is more open where the timber grew out; this being the case, the water can readily find its way into the timber by way of the open pores that stand out to the weather. If, on the other hand, these openings are turned mouths downwards, as would be the case if the post were set butt upwards, the water during a rainstorm would run off altogether, or remain on the surface of the post until evaporated by the heat of the sun. Fence posts out of which damp is kept will last many years longer than when exposed to the weather. Another thing about a picket fence that shortens its life very materially is the manner in which the lower end of the picket butts a water-table or ribbon piece. A picket should never butt anything below; the spaces between the pickets should be left open, so that water can get away and air circulate freely through every possible space. Notching the rails for the insertion of pickets is a bad practice, so also is boring holes in rails to receive round pickets. These methods increase the chances of water getting into the centre of the rails, thereby causing early rotting. Multi-form pickets, machine or hand-made, should be eschewed; they are in bad taste, weak, and offer more opportunities for decay than do plain pickets. Indeed, no wooden fence made conforms to good taste in a greater degree than one formed with plain flat pickets with pointed tops; the next best in order being a square picket fence, with the tops of pickets covered with a toad-back rail and moulding. In all cases of picket fences, it is better to nail the waist-band and base-board on to the face of the pickets, leaving an opening between the pickets, rail and base-board. When possible, the rails should be painted—at least one coat—before the pickets are nailed in place. This will preserve the rail and picket at their junction from rapid decay.

PROMINENT CANADIAN CONTRACTORS.

V.

MR. J. N. Gibb, of Wallaceburg, Ont., whose portrait appears on this page, is well known in Western Ontario as a successful public contractor. Mr. Gibb is a native Canadian, having been born in the County of Elgin in 1843. He has had a varied business experience, having been connected in his earlier years, with ranching, the lumber business, store-keeping, and gold mining.

In 1886 he entered the contracting business, for which he was well adapted, being possessed of a mechanical turn of mind, and having the ability to devise original methods of successfully carrying out difficult undertakings, a quality of the highest value to a contractor.

Mr. Gibb is the inventor and builder of several contracting appliances—one of which is a self-propelling pile driver, having two small paddle wheels which are worked by a bicycle gear from a driving shaft; another, a steam machine for cutting off piles at any depth below water; and a third, for boring and bolting timbers in any depth of water.

MR. J. N. GIBB.

Among the important works completed by Mr. Gibb may be mentioned the Erie and Huron docks at Courtright, ferry slip at Sarnia (for which he likewise drew the plans), several steel bridges in the county of Kent, which are said to be the only bridges in Canada resting on steel spile foundations.

Mr. Gibb is at present engaged on the construction of a wharf 321 feet in length for the Bushnell Oil Co., at Sarnia, Ont. He is ever on the look-out for improvements, and is highly esteemed for his enterprise and probity of character.

The employees of the Gurney Foundry Company, Toronto, held their annual picnic to Oshawa on Saturday, the 10th inst., per steamer Garden City. On arriving at the wharf the excursionists took the electric cars for Prospect Park, about three miles from the lake shore. Complete arrangements had been made for refreshments, sports, etc., and an enjoyable time was spent. Mr. Edward Gurney, the president of the company, Mr. Carrick, manager, Mr. Alcock, secretary-treasurer, and Mr. Cromwell Gurney were on hand, and took an active interest in the events.

National Association of Master Plumbers

SECOND ANNUAL CONVENTION

THE early days of July witnessed the opening in Toronto of the second annual convention of the National Association of Master Plumbers of Canada. In point of attendance, business progress and social features, it was a pronounced success, and would seem to mark the beginning of a new era for the plumbing trade of Canada.

On June 30th a secret meeting of the Executive Committee was held at the Palmer House, the headquarters of the delegates. At 10.30 o'clock on Dominion Day the convention proper opened, in the rooms of the Toronto association, Queen and Victoria streets, the president, Mr. Jos. Lamarche, of Montreal, in the chair.

The president appointed Mr. Wm. Briggs sergeant-at-arms, and the following gentlemen a committee on credentials: Messrs. W. H. Heard, London; M. H. Dunbrack, St. John, N. B.; A. Forest, Quebec. This committee reported the following delegates present:

London, Ont.—W. H. Heard, Wm. Smith, E. Holland.

Quebec, Que.—R. Sampson, A. Forrest, J. R. Kane, O. Matte, A. Pickard.

Montreal, Que.—Jos. Lamarche, J. W. Briggs, C. E. Thibault, P. J. Carroll, E. C. Mount, Arthur Martin, P. C. Ogilvie, John Watson, J. W. Harris, Thos. Moll.

Toronto, Ont.—Jos. Wright, H. Beavis, J. W. Burroughes, J. B. Fitzsimmons.

Ottawa, Ont.—John McKinley, F. J. Johnson.

Windsor, Ont.—M. B. Squire.

Halifax, N.S.—John Borton, Geo. A. Perrier.

St. John, N. B.—J. H. Doody, M. H. Dunbrack.

St. Catharines, Ont.—A. Chatfield.

Stratford, Ont.—J. A. Castlake.

St. Thomas, Ont.—W. Flaherty.

Peterboro', Ont.—Adam Hall.

Winnipeg, Man.—Represented by J. W. Hughes.

Toronto Junction, Ont.—Represented by Toronto delegates.

There were also present as visitors Messrs. Chas. T. Bull, St. Thomas; B. Noble, London; M. J. Laroux, Windsor; and a number of Toronto members, as well as representatives of the wholesale supply houses.

President Lamarche welcomed the wholesalers and manufacturers. He referred to the good feeling which existed between the supply houses and the plumbers, and thought their presence was an indication of willingness to continue to co-operate in the future. He announced that the next business was the appointment of a committee on resolutions.

It was moved by Mr. Burroughes, seconded by Mr. Martin, that a committee of five be named. Carried. The president then appointed Messrs. Jos. Wright, J. W. Harris, J. H. Doody, R. Sampson and Wm. Smith, to act in this capacity.

The president stated that any motions to be put before the meeting should be submitted. Motions amending the constitution would go to this committee.

At the desire of the delegates, it was decided to transact the business in English only.

Mr. Wm. Smith, vice-president for Ontario, submitted a notice of motion amending the constitution, which, he thought, would place the Association on a more solid foundation, and in which the following recommendations were made:

That there be a set of supreme officers, to be composed of the president, vice-president, treasurer, secretary, and sergeant-at-arms. That each province be formed into what shall be known as the Canadian Master Plumbers' Association of the Province of ——, to be composed of all the local associations in said province, and the local association to elect delegates to attend the provincial convention instead of the Dominion, as at present. That at each provincial convention three representatives be elected to attend the supreme convention, which would be held once a year. That a chart be issued to local associations by the supreme power, and that each local association be managed under the number system. That a certificate of membership be issued to each member of the local associations, said certificate to be forfeited upon his withdrawal from the association. That a seal be procured and adopted by the Dominion Association.

Moved by Mr. Mount, seconded by Mr. Hughes, that the following changes be made in the constitution and by-laws:

Article 1, page 20, after the word "plumbers" add "and steam-fitters." Article 4, page 21, erase the words in the third line "at or" 1st meeting in May and substitute "next convention." By-laws, article 7, add to fourth line after the words "convention" the words "unless otherwise decided by the convention," and article 17 to by-laws which shall be the order of business—"Montreal Resolutions"—To amend the interpretation of the term "master plumber" so as to include steam and hot-water fitters.

The above resolutions were referred to the Committee on Resolutions.

REPORT OF EXECUTIVE COMMITTEE.

The Executive Committee, composed of Messrs. Lamarche, Hughes, Burroughes, Mount, Doody and Fiddes, reported that three meetings were held during the year, one each at Montreal, Quebec and Toronto. The meeting in Quebec was rendered necessary by the accumulation of business which it was impossible to bring to a satisfactory conclusion by writing. The signatures of the Quebec wholesale dealers to the resolutions were secured, and at the Toronto meeting the long existing difficulties between the plumbers and the Plumbers' Supply Association were amicably settled. At the meeting in Montreal, a sub-committee was appointed, consisting of Messrs. Lamarche, Hughes and Mount. This sub-committee held forty-six meetings, besides a number of conferences. During the year local associations were formed in Winnipeg, St. Thomas, Stratford, Windsor and St. Catharines, and negotiations for the formation of an association were in progress at Vancouver, B.C. A number of towns were still unorganized, and it was urged that special efforts be made to get these places enrolled. Appreciation of the efforts of Mr. Wm. Smith, of London, in association work was expressed. The Executive strongly urged the necessity of delegates impressing upon their local associations the desirability of the members treating the association as an integral part of their business organization, and to look upon the money spent in keeping up an organization as a paying investment. They recommended the convention to consider the advisability of making a fixed annual charge instead of the present practice of making regular per capita tax calls on the members.

This report was also referred to the Committee on Resolutions.

REPORT OF SANITARY COMMITTEE.

Messrs. Heard, Hall, Mashinter, Clark and Birch, comprising the Sanitary Committee, reported that two meetings were held during the year, one at London on 3rd December last, and one immediately preceding the present convention. The meeting at London was called to assist the London plumbers in their efforts to obtain a plumbing and inspection law, which was now in a fair way of being accomplished.

An earnest effort had been made to answer some of the many difficult questions relating to sanitary construction and apparatus, and much care and deliberation were exercised to arrive at a satisfactory form of inspection law, and the results are shown in the annexed specifications. The question of license and regulation was also carefully considered. Reference was made to the progress which had been made in sanitary science in late years, and to the valuable assistance rendered in this connection to the Plumbers' Association by the trade press. In the opinion of the committee, nothing was so conducive to the good of the plumbers of Canada as a uniform specification, involving a close inspection and a good workable and effective license and regulation by-law. The Committee therefore recommended:

1. That a united effort should be made by each local association of master plumbers throughout the Dominion to have a bylaw enacted, similar to the one herewith submitted, thereby guaranteeing uniformity, which is thought to be the best way to agitate for a Dominion sanitary plumbing law.
2. That at least one member of the local Board of Health should be a practical master plumber, to be nominated by the local Master Plumbers' Association, and, where inspectors exist, they also to be members.
3. That at least one member of each provincial Board of Health should be a master plumber, nominated by the National Association of Master Plumbers, or Provincial Board where one exists.
4. That at least one member of the Dominion Board of Health should be a master plumber, nominated by your Association.
5. That there should be, in each town or city or municipality of sufficient size, a board of plumbing examiners, whose duties shall be to advise the Council or Board of Health upon all matters relating to the construction of sanitary plumbing and advise such changes as may be necessary to keep specification abreast with the times.
6. That directors should be under the control of this Board of Plumbing Examiners, who should also be empowered to decide upon and adjust all disputes arising from the operation of the bylaw.
7. That the constitution of the Board of Plumbing Examiners shall be one engineer, medical health officer, two master plumbers and one practical journeyman plumber, the last three to be chosen by the Master Plumbers' Association.
8. That inspectors of plumbing construction shall have full authority, subject to the Examining Board only.
9. That action be taken in Ontario first.

The committee further referred to the model by-law enacted by the province of Ontario as a step in the right direction, but thought it did not go far enough. The by-law was in the nature of a minimum that would be accepted by the Ontario Board of Health before any city or municipality can put in operation any system of sewerage, its being optional with any municipality to enact any by-law embodying more if they think it desirable or necessary.

The following is a copy of the by-laws recommended for adoption:

NO. —. A BYLAW TO LICENSE AND REGULATE PLUMBERS.

Whereas, it is desirable and necessary to license and regulate plumbers in the city of ——.

Therefore, the Council of the Corporation of the city of —— enacts as follows:

1. Upon and immediately after the passing of this bylaw and in every ensuing year before the first day of February, any person desiring to carry on the business or trade of plumbing, as a master plumber within the limits of the city of —— shall take out a license, for which license such person shall pay, at the time of issuing thereof, the sum of $——, except as hereinafter provided. No person shall receive such license unless he is of the full age of 21 years, and has a place of business within ——, and furnishes a bond binding himself in the sum of $200 with at least two securities in the sum of $100 each, to the satisfaction of ——, that he is himself a practical plumber, or that he will employ a sufficient number of regularly educated, practical and experienced plumbers to do all such plumbing work as he may engage to do, (whether he is a practical plumber himself or not) will not permit or allow any such work to be done by or for himself, or in connection with his business, except by such competent workmen, and that he will not violate any of the terms and conditions, rules and regulations contained in bylaw No. ——, and in any other bylaw in force from time to time in ——, respecting plumbing, drainage, sanitary matters and the water works.

2. That every person desiring such license shall file with the —— a petition in writing, giving the name of the applicant, and in case of partnership, the name of each member thereof, together with the place of business, and asking to become a registered plumber, and such petition shall be accompanied with the bond hereinbefore mentioned.

3. Any change in the firm or location of the business shall be properly reported to the ——, and the license shall be kept in a conspicuous place at the place of business.

4. A partnership of two or more persons desiring to carry on such business of master plumbers may do so on obtaining the license hereinbefore provided for and the word "person" in this by law shall include such partnership. When two or more persons are licensed as partners the license shall be issued in the name of the firm or co-partnership, and no license shall be transferable.

5. All licensed master plumbers shall be held responsible for all acts of their apprentices or employees in connection with the business for which license is issued.

6. Every such license unless it is expressed to be granted for shorter period and unless the same shall become sooner forfeited as hereinafter provided, shall be for the year current at the time of the passing thereof, and shall expire on the 31st day of December next succeeding the date of the same.

7. Upon satisfactory evidence furnished to the Board of Plumbing Examiners, that any plumber has been twice convicted for any violation of this bylaw or of any of the bylaws respecting plumbing, drainage, sanitary matters or waterworks, the said Board of Plumbing Examiners shall declare the license forfeited.

8. Any plumber whose license shall be declared forfeited as hereinbefore provided, shall not again be entitled to a license until the said declaration of forfeiture shall be revoked by the Board of Plumbing Examiners as hereinbefore provided.

9. No person shall carry on business in —— of —— as a master plumber, unless he is the holder of a license issued as hereinbefore provided to himself or to the partnership of which he is a member.

10. Within one month after the passing of this bylaw, every man at work in the —— of —— as a journeyman plumber shall register his name, age, residence, and name of present employer, and any journeyman plumber who is not now employed as such, who may desire to be so employed in the —— of —— hereafter, must before commencing work, comply with the foregoing regulations, and further that a fee of 25c. be charged for each such name registered.

11. That any person or persons, guilty of an infraction of any of the provisions of this by-law, shall, upon conviction before the Mayor, Police Magistrate, Justice or Justices of the Peace of ——, on the oath or affirmation of any credible witness, forfeit and pay at the discretion of the said Mayor, Police Magistrate, Justice or Justices of the Peace convicting, a penalty not exceeding the sum of fifty dollars, ($50), for each offence, together with the cost of prosecution, and in default of payment thereof forthwith, it shall and may be lawful for the Mayor, Police Magistrate or Justice convicting, as aforesaid, to issue a warrant under his hand and seal, or in case of the said Mayor, Police Magistrate, and Justice or Justices, or any two or more of them acting together therein, then under the hand and seal of one of them, levy the said penalty and cost or costs only, by distress and sale of the offender or offenders' goods and chattels, and in case of no sufficient distress to satisfy the said penalty and said costs, it shall and may be lawful for the Mayor, Police Magistrate, Justice or Justices, convicting as aforesaid, to commit the offender or offenders to the common gaol of the —— of —— with or without hard labor for any period not exceeding one calendar month, unless the said penalty or cost be sooner paid.

12. The Council shall, from time to time, as occasion may require, on the nomination of the Board of Plumbing Examiners, appoint such inspector of plumbing as may be found necessary, but no person shall be eligible for such appointment who shall not have passed a satisfactory examination for proficiency in both practice and theory of plumbing and drainage before the Board of Examiners, as hereinafter provided. Such inspector or inspectors shall have full power to act on all matters under the by-law subject only to the Board of Plumbing Examiners. Such inspector shall be under the supervision of the Board of Health, and shall be attached to the office of the city engineer, and shall be paid such salary as the Council shall determine.

13. The Board of Plumbing Examiners is hereby constituted to consist of one engineer, medical health officer, two master plumbers in good standing in the —— of ——, and one practical plumber to be chosen by the Master Plumbers' Association. The last three shall hold office for one year after their appointment, and shall be paid a fee of four dollars for each session of the board, and the board shall be called together by the engineer (who shall be chairman of the board) at such times as the chairman shall find necessary.

14. In case any dispute arises under the by-law to license and regulate plumbers, as to whether any person or persons employed by a licensed plumber is a regularly educated, practical and experienced plumber, as in said by-law provided, and said master plumber may require the —— to permit the said workman to be examined before the said Board of Examiners, whose decision, properly certified as to the competence of the said workman, shall be final and conclusive.

15. It shall be the duty of the above mentioned plumbing examiners to inquire into all changes or disputes arising from the operation or interpretation of any part of by-law No. — entitled "A By-law to Secure the Sanitary Condition of Buildings," to hear and decide upon all disputes between the plumbing inspector and the public, and between the said inspector and the plumbers of the —— of —— and their decision shall be final and conclusive. It shall be the duty of the chairman of the plumbing examiners to take such necessary action within one week from proper notice to him in writing against any person accused.

16. In case of any dispute arising relating to any provision of the above mentioned by-laws, the party who disputes shall give notice to the city engineer in writing, setting forth the nature of the dispute, and shall appear before the Board of Plumbing Examiners, who shall hear and decide on the merits of said dispute, and the decision of the said board shall be final and conclusive.

NO. —, A BY-LAW TO SECURE THE SANITARY CONDITION OF BUILDINGS.

Whereas it is desirable and necessary to make provisions to secure the sanitary condition of buildings.

Therefore the Council of the Corporation of the city of —— enacts as follows:

It shall not be lawful to construct or extend any drain for the reception of sewage or waste water under or into any building (except stables), or to connect same with any public sewer or drain, except the said drain, shall in its plan and construction conform to the following requirments:

PERMIT.

1. Before proceeding to construct, reconstruct or alter any portion of the drainage, ventilation or water system of an hotel, tenement, warehouse, dwelling house or other building, the owner or house agents constructing the same shall file in the office of the —— an application for a permit therefor, and such application shall be accompanied with a specification or an abstract thereof in a blank form prescribed and supplied for this purpose, stating the nature of the work to be done, and giving the size, kind and weight of all pipes, traps and fittings, together with a description of all closets and other fixtures, and a plan with the streets and street numbers marked thereon, and showing the drainage system underground.

2. All plans must be legibly drawn in ink on heavy white paper or tracing linen, and must be drawn on a scale of eight feet to one inch.

3. A permit must be granted or refused within two days from the time of filing of the application, and the permit of the —— (if granted) shall be valid for six months from the date issued.

4. If the —— shall find the said plans and specifications do not conform with the rules and requirements laid down in respect to the drainage and plumbing in the by-law in the city of ——, he shall not issue any permit for such plumbing and drainage, and it shall be unlawful to proceed therewith.

5. The —— shall be notified when any work is ready for inspection, and all work must be left uncovered and convenient for examination until inspected and approved of. The inspection shall be made within two days, except where the soil is of such a nature that it cannot be left open for two days, when the inspection shall be made forthwith after notification shall have been given to the ——. The —— or inspector appointed by the corporation, appointed for that purpose, shall call for smoke test, which test shall be made by the party whose work is being inspected under the direction of the said —— or inspector. The —— or inspector is to supply the machine or instrument to make

said test, and the result of said test shall be recorded in the —— office. If the work is not found to be satisfactory, two days' notice shall be given, and if the work is not made satisfactory the penalty clause shall be endorsed forthwith.

6. After a plan or specification has been approved of, no alteration or deviation from the same shall be allowed except on a written application of the owner or the agent of the owner to the——.

TILE, PIPE AND CONNECTIONS.

7. Vitrified salt glazed earthenware drain pipes shall be equal in quality to those used for the private drain connections; they shall be laid and jointed with Portland cement or otherwise as shall be specified by the —— for the private drain connection contract. The pipes used for surface or weeping drain must be laid around the outside of house walls where practicable and tapped to connect with the rain water leader. They shall have a tap placed on them which shall be easily accessible for flushing. All earthenware drains laid on newly-made ground, or very wet soil, to be placed on a prepared foundation of plank or concrete. No built or mason's traps shall be used, all traps shall be of vitrified salt-glazed earthenware or iron. All drains must be properly connected with a private drain and not covered until inspected. In no case shall drains between walls of a house and street be laid until the private drain from the street line to the public sewer has first been laid and completed. All private drains laid by the city are to be taken to the outside of the wall where the buildings are on the street line. No tile shall be run through or under the wall of any building.

SOIL PIPE.

8. All soil pipe within the walls of any building shall be of iron or brass, and shall be continued at least three feet above any opening in the roof and three feet above any opening in an adjoining building, when such building is within 10 feet of such pipe, and left open so that the whole of the inside drainage may be thoroughly and constantly ventilated. (Approved tile may be used under ground; if, however, the house is drained by a continuous iron pipe from the outer connection with the house drain at least three feet outside the wall to the opening above the roof, as hereinbefore provided, the trap and the fresh air inlet may be dispensed with). After the passing of this by-law, no privy sinks, pan closets or any other water closets having any mechanism in connection with the bowl forming a mechanical seal, and no closet or other convenience which allows the escape into the house of gas which has been confined in any part of it or to the drain or soil pipe or which allows the accumulation of filth in or about it, shall be fitted up or used. When a soil or drain pipe (which in all cases must be of iron) passes through a wall it shall not be built in solid, and shall have at least two inches clearance, and the opening shall be covered by arch or line lintel. Earthen or iron water closets having traps above the floor using lead connections must have a cast brass flange not less than ⅛ inch thick, soldered to the lead and bolted to the trap of the closet, the joint being made perfectly air-tight.

Siphon jet, washouts and flushing rim hopper closets only will be allowed, and they must be fitted with flushing tanks, automatic or otherwise, of approved character and design.

No pipe shall weigh less than the following for length of 5 feet:

6 inch diameter	100 lbs.
5 "	85 "
4 "	45 "
3 "	30 "
2 "	20 "

All pipes, traps and fittings shall be of good quality, and shall be free from flaws or defects and shall be of uniform thickness.

CESS PITS AND VENTS.

10. All connections with cess pits shall be made in same manner as for sewer, with the addition that the cess pit must be ventilated independently with separate pipe of not less than 4 inches diameter and 10 feet high, so placed that the drain pipe from the trap outside the wall to the extreme end shall have free and uninterrupted access to the atmosphere at each end.

FITTINGS.

11. No tees shall be used, but Y connections and ⅛ inch bends, or the combination of the two in one fitting, shall be used where practicable.

MAIN TRAPS.

12. Between the house and the public sewer or drain at the lower end or foot of the vertical stack of soil pipe and between the stack and the public sewer, inside the wall of the building which it serves, there shall be placed a ventilation hand hole trap of approved descriptioo and make.

CLEANING OUT SCREWS.

13. The pipe to have two cleaning-out screws of not less than four inches in diameter, one located about 42 inches above and in front of the bend in the basement floor, the other to be located between the said bend and the outer wall of the house. The first-mentioned above cleaning-out screw shall be provided with a connection of the proper size to admit of the testing apparatus being attached.

SEWER VENT.

14. On the sewer or street side of said soil pipe trap a ventilation pipe shall be placed of the same size and kind as the soil pipe and carried above the roof, as hereinafter specified for soil pipe.

FRESH AIR VENT, INLET.

15. Above the said trap there shall be connected with the main soil pipe an inlet pipe not less than four inches in diameter for the admission of fresh air. This pipe shall be brought up to 5 feet above grade, and if for detached building and on outer wall may be carried above the roof with the same diameter of galvanized iron pipe properly hooked to the wall every eight feet. In all cases where the above pipe cannot conveniently be carried on the outside wall, then it shall be run up inside the wall and carried through the roof in the same manner as specified for main soil pipe, provided in all cases that the fresh air pipe shall be stopped at a point three feet lower than the main stack or soil pipe, the mouth of which shall be left open, or covered with basket if required.

16. Trap vent pipes may be of cast iron, lead or brass; sheet metal will not be allowed. All traps and fittings shall be equal, in quality and thickness, to the pipe to which they are attached.

17. No lead, waste or vent pipes shall weigh less than the following: 1½ inches in diameter, 8 lbs. per yard; 2 inches in diameter, 10½ lbs. per yard; 2½ inches in diameter, 13½ lbs. per yard; 3 inches in diameter, 16½ lbs. per yard; 4 inches in diameter, 24 lbs. per yard.

18. Every water cock, bibb tap or hydrant attached to any water service or pipe, connected with and supplied from the water works system of the ——, shall have legibly stamped thereon, in a conspicuous place, the name of the maker, and the same is to be properly tested both as to strength and weight before being so attached.

19. All water supply pipes shall be laid with due regard to danger from freezing, properly laid with a fall to a stop and waste cock placed in the cellar or other convenient place where they can be entirely drained off. Each consumer in a tenement building shall be supplied with a separate stop and waste cock on the service pipes inside the building unless metred.

TRAPS.

20. All drains and plumbing fixtures of every house or other building shall be supplied with sufficient traps and vents to prevent gas from the sewer, drain or other waste pipes escaping into any apartment, and every such fixture shall have its own trap with sufficient vent. No fixture shall drain through more than one trap (main trap excepted.) The ventilation pipes from the traps of any fixture shall be of the same size and weight as the traps they serve, up to and including 1½ inches in diameter. For sizes over 1½ inches in diameter, one size less may be used, and for length as hereinafter specified. No vent to be used of less than 1¼ inches in diameter.

TRAP VENTS.

21. No trap vent pipe shall be less than 3 inches in diameter where it passes through the roof. The rule for soil terminus, as hereinbefore mentioned, shall govern said vent pipe. Vents from water closet traps to be two inches for a length of 20 feet, and for a greater length three inches in diameter. Closet vents into which other vents are connected to be 3 inches in diameter.

AUTOMATIC VENTS.

22. Approved automatic vents may be substituted when necessary or advisable on special permit of the inspector.

OVERFLOW.

23. No safe waste, range boiler or cistern overflow shall be allowed to connect to any drain. All rain water and leaders shall be trapped, said trap to be connected with outside drain.

24. Wherever safes are placed under fixtures, the safe waste shall be run separately to the basement or cellar and be closed by a hinged brass flap valve of approved device to prevent cellar air from rising through the pipe. Urinal platforms shall not be provided with safe wastes.

25. The enclosing of water closets in wooden casings is prohibited. Water closets should never be placed in ao unventilated room or compartment. In every case the compartment must be open to the outer air or be ventilated by means of ao air shaft not used to ventilate any living or sleeping room and having an area of at least one square foot and an openiog at the roof to the external air of an area equal to the area of the shaft.

26. Wooden laundry tubs and wooden sinks are prohibited. All such fixtures shall consist of non-absorbent material.

FERRULES.

27. Every connection between lead and iron pipes shall be made with brass thimbles or ferrules having properly wiped joints, and the ferrules shall be properly gasketted, leaded and caulked into the said pipe. Ferrules for 4-inch pipes shall weigh not less than 2½lbs.; for 3-inch pipes, not less than 1¾lbs., and for 2-inch pipes not less than 1½lbs., each ferrule not to be less than 4 inches in length. All lead pipes to have properly wiped joints. Where the trap to closet is above the floor, the said connection of the same to soil pipe shall be made of brass and rubber.

SINKS.

28. Each house or building must have its own separate soil pipe and drain, aod such soil pipe or drain shall be so placed as to be always readily inspected without destruction to walls, and the plumber shall be responsible for the connection of his work with the system of drainage, which connection shall be made by a cast-iron bend and three feet of pipe extending horizontally from the vertical soil pipe, and no two or more houses or buildings shall have drain in common until each separate drain shall have passed outside the walls of the house or building which it serves.

REFRIGERATOR WASTES.

29. Refrigerator wastes shall be supplied with properly ventilated traps and be disconnected and have drip basin.

30. For water works pressure no lead pipe shall weigh less than the following: ⅜ inch internal diameter, 4 lbs. per lineal yard; ½ inch internal diameter, 6 lbs. per lineal yard; ⅝ inch internal diameter, 8 lbs. per lineal yard; ¾ inch internal diameter,

10 lbs. per lineal yard; 1 inch internal diameter 13 lbs. per lineal yard.

Galvanized wrought-iron pipe and fittings may be used for water supply pipes if desired, but no black iron pipe shall be used.

31. Every master plumber who shall himself or by his apprentice, agent or employees make any extension or alteration to, or shall remove any tap, pipe or other fixture attached to the pipes of the water works, shall, on the first day of the month in which such extension, alteration or removal was made, report the nature or extent of the same in writing to the engineer upon a written form to be supplied by said department.

32. No person except a duly qualified and registered master plumber under this law shall be allowed, without first having obtained a permit from the Water Works Department, to open or shut off a stop-cock in connection with the service supplying any premises, unless in case of urgent necessity to prevent loss from flooding, or in case of a plumber to make necessary repairs or to test his work, and shall in every such case leave the stop-cock as he found the same, and any person who shall commit any damage to any stop-cock in the service pipes of the department renders himself liable for the amount of any such damage.

33. No person except a duly qualified and registered master plumber, under this law shall be allowed to build, lay, alter or change any branch pipe or connect same to the system of sewers in the city of ——.

34. No person except a duly qualified master plumber, properly registered under this law, shall make any connection to or run any pipe for the purpose of conveying water from the —— water works into any building or ground in the city of ——.

35. All work contemplated in this bylaw shall be done in a workmanlike manner and shall be subject to the inspection and supervision of the inspector appointed by the Corporation of the city of —— for that purpose, and all faulty or defective work which may at any time be discovered shall be made satisfactory to the said inspector, and when found satisfactory the certificate shall be issued to the plumber.

36. No arrangements shall be made for supplying urinals except by self-closing cocks or automatic flush-tanks, and no arrangements shall be made for cleaning water closets or privy vaults by waste pipes from wash basins or by sinks or by any other means or evasion, but they shall be fitted up with the fixtures and appurtenances belonging to them respectively.

37. The —— engineer, the medical health officer, and any inspector appointed for that purpose shall have the right at proper hours of the day and upon reasonable notice given and request made upon owner or agent, to enter upon and have free access to all parts of any building in the——, in which water from the waterworks is delivered or consumed or has connection to the sewer.

38. That section 15 of the by law appended to the Public Health Act is hereby repealed within the city of —— except rule 1 thereof.

39. This bylaw shall go into force immediately on the passing thereof.

Section 40 referred to non-compliance with the provisions of the by-law, and the penalty to be imposed, which was placed at $50 for each offence.

The report was referred to the Committee on Resolutions.

REPORT OF LEGISLATIVE COMMITTEE.

The Legislative Committee, composed of Messrs. McKinley, Borton aod Johnson, reported the cost of iocorporation as $280, made up as follows: Advertising, $30; Government fees, $100; Solicitor's fees and disbursements, $150. It was also necessary to get incorporation under the Manufacturers' Act to have $40,000 of subscribed stock, as well as a seal, which would cost $4.50. Report referred to Committee on Resolutions.

REPORT OF APPRENTICESHIP COMMITTEE.

The report of the apprenticeship committee dealt with the necessity of young men learning their trade thoroughly, and remaining in one shop instead of moving around. The card system was recommended for adoption, by which means an apprentice could not be taken on by another plumber without having a proper clearance card from his last employer. There were times when a master plumber was compelled to reduce his staff, and the card system would enable the discharged apprentice to complete his training in another shop.

This report was also referred to the Committee on Resolutions.

The report of the Essay Committee was then read by the Secretary. It laid special stress on the necessity of obedience to the principles of sanitation. Lack of space prevents us giving a more detailed synopsis of the report, which was referred to the Committee on Resolutions.

Mr. W. J. Burroughes, president of the Toronto association, here introduced to the convention Ald. Scott, Chairman of the Reception Commitee of the City Council. In doing so, he took occasion to outline the programme arranged for, and invited all master plumbers to attend the convention.

Ald. Scott then welcomed the delegates. Among other things he said: "You are engaged in looking after the comforts, conveniences and safety of the community, and it is right to expect reasonable and proper reward. I hope that the occasion of your convention will result in some of the dissatisfactions which, I learn from one of your reports, exist, being removed, and that it will be a benefit to others as well as yourselves. Your craft is a very ancient one. Until recent years it was supposed that the manufacture of lead pipe was of recent origin. This has lately been found to be a mistake, for over 1,800 years ago the plumbers' craft was pursued, except in the matter of sanitation, on much the same line as it is to-day. It was my fortune to visit some time since a city which had been buried for over 1,800 years, and there I found lead pipe and traps all very much the same as we see in use to-day, showing that the Romans over 1,800 years ago were engaged in the same class of work as you are to-day. I wish you success in your convention."

The president gratefully acknowledged the hearty reception extended by Ald. Scott, on behalf of the city. It was a fact, he said, that the city of Toronto had the best sanitary laws in Canada, and these laws were carried out. They had assembled together to discuss questions which contributed to the happiness of the citizens and for the purpose of securing better plumbing.

Mr. Hughes, secretary, also spoke at some length. He congratulated his Toronto friends upon the improvements that had taken place since his last visit about sixteen years ago. Referring to the statement made by Ald. Scott that their trade was an ancient one, he said the very name they bore was taken from an old Roman work, "plumbum," meaning lead. It is to-day almost a misnomer. White lead pipe was once the staple, it was now being used less and less. Concluding, he remarked that he could not see why legislators should safeguard the public against poor doctors and not against poor plumbing.

The president then called upon the representatives of the supply houses to say a few words, Mr. Edward Gurney, Mr. A. A. McMichael, of the James Robertson Company, and Mr. Anthes, of the Toronto Foundry Company, responding.

Adjournment for lunch was then announced. During intermission the group photograph, which we print on another page, was taken on the Metropolitan church grounds.

AFTERNOON SESSION.

Upon re-assembling, the reading of the president's address was the first business. This was done by Secretary Hughes.

PRESIDENT'S ADDRESS.

The president, in his address, outlined the early work of the Association, and pointed out the necessity of the Executive Committee answering all correspondence promptly. New associations, he said, had been formed in several places. Members from Sherbrooke, Richmond, and St. Hyacinthe had affiliated with the Montreal association, and he had news that an effort was being made to organize in Vancouver, B. C. It was important that the smaller towns and villages as well as the cities should organize, as the same interests bound them together.

Regarding the relations between the plumbers and the wholesale dealers, he was glad to say that all the principal dealers and nearly all the wholesale houses had signed the resolutions, thereby showing their good wishes towards the craft. He had an important interview with Mr. McMichael, of the James Robertson Company, in Montreal, and as a result Mr. McMichael stated that he would not only advise the Plumbers' Supply Association to sign the agreement, but would try and have it lived up to. The Master Plumbers' Association should, he thought, assist the wholesale men by supplying them with the names of all legitimate master plumbers. Each local association should look after its own members and report to the National. The plumbers themselves were their own enemies. It was yet common to see master plumbers going into wholesale stores, getting the goods charged to their customers and getting a discount reserved on the sales made. This was paving the way for the customer to return to the wholesaler, and puts the wholesale man in a false position if he should refuse to sell. They had also suffered through the journeyman plumbers, who took customers to wholesale houses and bought material and had the work done by day. One large manufacturing firm, the Robert Mitchell Company, of Montreal, had discontinued their contracting department, and would continue only as a supply house. This was a step in the right direction, and the president hoped others would soon follow. In January last the Executive Committee met in the city of Quebec and discussed several objections which were made to the resolutions principally affecting the hardware stores, engine builders, pump manufacturers, brewers, etc. Certain decisions were arrived at, but this convention would have to try and solve that problem. The plan adopted last year of naming the president, the secretary, and a delegate for sub-committee was a good one, and should be continued. Be careful, he urged, in the choice of executive officers. The services of Mr. J. W. Hughes, the able secretary, had been of great benefit to the association. Plumbing by-laws in cities and towns should not be overlooked, as they were the foundation of success. It was through them that the standard of plumbing would be elevated. In conclusion Mr. Lamarche thanked the trade press for the assistance rendered the association and the association for the honor conferred upon him by his election as its chief executive officer.

The reading of the address was greeted with applause.

Here a letter was read from the Toronto Plumbers' Supply Association, soliciting a conference with a committee of the National Association of Master Plumbers, and Messrs. Lamarche, Burroughes and Fitzsimmons were appointed.

Mr. Wm. Smith, vice-president for Ontario, submitted his report, which stated that one of his first duties was to appoint a

Sanitary Committee, composed of Messrs. W. H. Heard, London; A. Clark, Hamilton; W. Mashinter, Toronto; A. Hall, Peterboro; I. Birch, Kingston. He had organized during the year local associations at Stratford, with five members; Windsor, with eight members; and St. Thomas, with six members. Attention was directed to the necessity of having proper printed matter for the association, and to the laying down of laws and penalties to govern all members. The corner-stone of success, he thought, was secrecy. He found that in London the wholesale men had been informed too much of what the plumbers were doing, and as a result the latter were suffering.

MR. JOSEPH LAMARCHE, Retiring President.

This report was also referred to the Committee on Resolutions.

Mr. J. W. Hughes, as secretary, submitted his report. During the past year 363 letters had been written from his office, besides the annual reports, circulars and other printed matter. The number of members of the local associations was as follows: Montreal, 82; Toronto, 55; Ottawa, 9; Quebec, 22; Windsor, 7; St. Thomas, 6; London, 15; St. Catharines, 6; Stratford, 5; St. John and Fredericton, N.B., 20; Winnipeg, 8, in affiliation with Montreal; Hamilton, Kingston, and Halifax, not given.

The report of the treasurer, Mr. A. Fiddes, showed the receipts from the secretary to have been $457, while $60 had been received from the Windsor, St. Thomas, Ottawa and Winnipeg associations. The disbursements were $162.60, leaving a cash balance of $365.40.

These reports were referred to the auditors, who reported them correct.

The Committee on Resolutions presented a report, recommending the adoption of the reports of the Executive, Sanitary and Essay Committees, which was agreed to by the convention. It further recommended that clauses 1, 2, 3 and 4 of Mr. Smith's notice of motion be filed for future reference, and that clauses 5, 6, 7, 8 and 9 be adopted.

Mr. Briggs moved, seconded by Mr. Burroughes, that the report be discussed clause by clause. Carried.

Mr. Burroughes thought the clause to issue a chart was premature, as the question of securing incorporation was under consideration.

Both Mr. Burroughes and Mr. Smith produced sketches of the proposed charts. The cost of incorporation was referred to, and eventually it was decided to leave clauses 5, 6 and 7 over for consideration. Clauses 8 and 9 were also left over, pending the report of the Legislative Committee.

The Legislative Committee subsequently handed in a report recommending that no action be taken towards incorporation at present, and stating that incorporation under the Dominion Act was considered impossible. This was finally agreed to, but the Executive Committee was instructed to obtain further information and report.

The sub-committee on constitution and by-laws reported, recommending slight alterations, which, on motion of Mr. Heard, seconded by Mr. Borton, were adopted.

The Committee on Resolutions reported that after hearing the report of the Legislative Committee in regard to incorporation, this committee is of opinion that clauses 5, 6, 7 and 8 of Mr. Smith's motion should be adopted.

A secret session in the evening closed the business of the first day.

SECOND DAY.

The meeting resumed at 10:30 on Friday, President Lamarche in the chair.

A letter from a Quebec house regarding members of the association not dealing with local houses caused the following resolution to be passed: That this convention desires to impress upon master plumbers the importance of encouraging preference for their local dealers when prices and material are equal, and that the Executive Committee be authorized to notify all master plumbers and wholesale dealers to that effect.

The result of the conference between the committees of the Plumbers' Supply and Master Plumbers' Associations was announced by Mr. Burroughes, who read the following minutes:

Messrs. Jos. Lamarche, president; W. J. Burroughes, vice-president; J. B. Fitzsimons represented the National Association of Master Plumbers, and Messrs. A. A. McMichael, P. McMichel, James Morrison, A. McArthur, W. A. Carrick, A. Anthes, Ed. Gurney, Geo. A. Booth, of Toronto, and Mr. McLaren, of Montreal, the Plumbers' and Steam-Fitters' Supply Association.

The definition of the term "master plumbers" was discussed at length, and it was finally decided that the National Association furnish a list of the bona fide master plumbers to the wholesale dealers. The clause referring to iron pipe being placed on the exempt list was discussed at length. President Lamarche announced that he could not consent to make exemptions for any particular city or province, and that it must be largely governed by local conditions. No definite action was decided upon outside of the convention.

Mr. Gurney requested that boilers and soil pipe for green house work be placed on the exempt list. A lengthy discussion ensued, Mr. Gurney pressing his claim, Messrs. Lamarche, Burroughes and Fitzsimons opposing him. Mr. Gurney contended that he had always enjoyed this privilege, and he could not see that any injustice would accrue to the plumber, as the purchaser always did his own fitting up.

"Your committee beg to report they refused to consent to this suggestion, and gave as a reason it would open up the door for manufacturers of other specialties." It was also suggested by the supply men that a 10 per cent.—margin might be adopted. Mr. McMichael also requested that the committee report back to this association. They think the master plumbers should, in justice to all concerned, confine the purchase of their supplies to the signers of the resolutions.

On motion of Mr. Burroughes, the report was referred to the Executive Committee.

It was reported that nothing had been done with regard to affiliating with the Master Plumbers' Association of the United States. The matter was left with the Executive Committee.

MR. JOSEPH WRIGHT, President-elect.

ELECTION OF OFFICERS.

The president named the Nominating Committee as follows: George Perrier, Halifax; J. R. Kane, Quebec; Thos. Moll, Montreal; F. J. Johnson, Ottawa; A. Purdy, Toronto. This committee nominated the following:

President—Jos. Lamarche, Montreal.

Vice-president—Wm. Smith, London.

Vice-presidents for provinces—Ontario—John McKinley, Ottawa. Quebec—P. J. Carroll, Montreal. New Brunswick—J. H. Doody,

St. John, N. B. Nova Scotia—John Borton, Halifax. Manitoba—L. A. Irvine, Winnipeg.

Secretary—J. W. Hughes, Montreal.

Treasurer—Wm. Briggs, Montreal.

Executive Committee, one from each province—Ontario, J. B. Fitzsimmons, Toronto; Quebec, R. Sampson, Quebec; New Brunswick, Thos. Campbell, St. John; Nova Scotia, George A. Perrier, Halifax; Manitoba, W. Stephenson.

Messrs. Lamarche and Hughes thanked the committee for again nominating them to office, but thought it proper that a change of officers should be made and declined to stand, Mr. W. J. Burroughes vice-president, having, for personal reasons, refused to accept office in the association, the committee submitted the name of Mr. Jos. Wright as president and Mr. W. Mansell as secretary.

At this stage Mr. Burroughes said that this was an important matter, and they should take into consideration not only the standing of the nominees, but also their ability and willingness to act. A great deal of executive ability was required to keep matters running smoothly, and he hoped those who accepted office would not allow their enthusiasm to relax until their term of office had expired. They had with them a gentleman who was well versed in every detail of the work, and he moved in amendment that Mr. Wm. Smith, of London, be elected president.

Mr. W. MANSELL, Secretary.

Mr. Wright declined in Mr. Smith's favor, and seconded the motion, but it was not the wish of the convention that he should retire.

Upon a ballot being taken, Mr. Wright was declared elected president.

For secretary, Mr. Fitzsimmons put forward in amendment the name of Mr. Burroughes, but Mr. Burroughes having refused to be nominated for president, declined to accept the secretaryship. He had private reasons, he said, for refusing to accept any position in the association.

No other nominations being made, Mr. Mansell was declared elected as secretary.

The newly-elected officers thanked the Association for the honor conferred upon them.

Upon motion of Mr. Lamarche, seconded by Mr. Smith, Quebec was chosen for the holding of the next annual convention, the date to be fixed by the Executive Committee.

Votes of thanks were then tendered to the retiring officers and acknowledged by them.

A special committee reported in favor of imposing a per capita tax of $4 per member for the ensuing year. The report was referred to the Executive Committee.

Mr. J. H. Harris, of Montreal, expressed thanks on behalf of his French-Canadian confreres for the manner in which they had been treated. The English, he said, were more active than the French-Canadians, but when the latter once enlisted in the ranks they were hard workers. They had an example of that in their ex-president. "We are trying hard," he said, "to get more of our French confreres to come into the Association, and when they come to consider the work we are doing for them they will come in. When they do come in they will be workers." He moved a vote of thanks to the master plumbers of Toronto, which, being seconded by Mr. Hughes, was carried amid applause.

The business of the convention here ended, and the afternoon and evening and the following day were devoted to enjoyment.

SOCIAL FEATURES.

The president, Mr. Joseph Wright, has received from an eastern delegate, whose identity is not disclosed, a somewhat lengthy resume of the social features of the convention, which shows that the efforts of the Toronto association to royally entertain their visitors were fully appreciated. From this we extract the following:

IMPRESSIONS OF A DELEGATE TO THE RECENT MASTER PLUMBERS' CONVENTION.

Having been appointed a delegate from our association to the convention of the master plumbers, which met in Pythian Hall, Toronto, on Dominion Day, I cannot allow this, my first visit to the Queen City of the West, to pass without in my humble way expressing to my fellow craftsmen of Toronto and to the hospitable citizens my thanks for their kind and generous treatment of us, in making our stay in their beautiful city so pleasant that in years to come it will be treasured as one of the brightest periods in our lives.

Toronto has the reputation of being an ideal city in which to hold conventions, as evidenced by the many associations which are to meet during the summer and autumn months. Some of these, such as the Epworth League and the British Association for the Advancement of Science, which meet in the city in a short time, are continental and world-wide in their reputation. At the former from 30,000 to 40,000 delegates are expected from all parts of America, and at the latter, the eminent scientists of the world are to meet together in convention and compare ideas. Mankind at large will be thoroughly benefitted, and men will rise and call them blessed. And why should they not the master plumbers, who in a large measure hold the health of the community in their hands? From the strides which have been made in the science and art of plumbing during the Victorian era, when plagues and epidemics, which were called by many visitations of the wrath of God, are unknown, well may the public rise as one man and offer to us the glad hand that we are enabled, by mutual exchange of ideas, to place the dwellings we live in free from the germs of disease.

Such is the good work that our association is doing; but it is not my intention to go into details of the many matters which were brought up at the convention, but simply to express my appreciation of the manner in which we were entertained during our stay in the city as the guests of the local Master Plumbers' Association.

Mr. WM. BRIGGS, Treasurer.

On our arrival in Toronto we were received by the Entertainment Committee, and after our afternoon's work were taken in a large steamer, which can carry 2,000 passengers without crowding, across the bay to the Island, which lies about a mile from the city. On the Island are situated the lovely summer quarters of the Royal Canadian Yacht Club. I accepted an invitation from one of the members of this club and was royally entertained. After seeing the various sights and

partaking of light refreshments, which for another name we will call coffee, we returned to our hotel, feeling as fit as a fiddle for the work of our convention on the following day.

At the morning session we were welcomed to the city by Ald. Scott, on behalf of the Mayor, corporation and citizens, by Mr. Edward Gurney, president of the Board of Trade, and also by Mr. W. G. Burroughes, president of the local Plumbers' Association. After this we adjourned to the grounds of the Metropolitan church, where we were photographed.

The business of the committee being concluded on Friday morning, we accepted the invitation of Ald. Scott, chairman of the Reception Committee of the Council, who was accompanied by Ald Beale, to take a carriage drive to view the sights of the city. It took twenty carriages to contain the delegates and their friends. Our first halt was made at the new municipal buildings, of which Mr. E. J. Lennox is the architect. They will cost about $2,000,000, and are a credit to the city and to the architect who designed them. I understand that the Bennett & Wright Co., Ltd., of which our new president, Mr. Jos. Wright, is a member, has the contract for the heating, ventilating, plumbing and electric wiring, amounting to nearly $200,000, which is no doubt the largest contract for that class of work ever let in the Dominion of Canada.

Proceeding along Queen, Jarvis, Gerrard and Sherbourne streets to Bloor street, we passed the Horticultural Gardens, with their artistically laid-out walks and beautiful shrubbery. Driving through the Queen's Park, we visited the noble pile known as the Parliament buildings, the home of the Ontario Legislature. In Queen's Park are monuments erected to the memory of the late Sir John A. Macdonald and Hon. George Browne, also to those brave volunteers who fell in defence of their country at Ridgeway in 1866 and at Batoche in 1885. Just beyond the park are the classic buildings of Toronto University, which were destroyed by fire some seven or eight years ago, but which, rebuilt and enlarged, are a credit to the province and up-to-date in every department. After a drive to the extreme western part of the city, we entered the gates of High Park, a large park containing nearly 200 acres and with beautiful drives in all parts of it.

A drive along the Humber Bay brought us to Dufferin street, and at the kind invitation of the Toronto Radiator Company, we inspected their offices and works. At the entrance to their offices was a streamer with "Welcome to the Master Plumbers' Association" in such large type that it would attract the eye of every visitor. On assembling in the show rooms, Mr. Adam Taylor, who is acting manager in the absence of his brother, Mr. John Taylor, who is in Europe, extended on behalf of the president and board of directors, an invitation to partake of refreshments, which had very thoughtfully been provided. After our drive of three hours you may imagine that most of us were feeling rather fatigued, for the day was very hot; so we required no second invitation, and in a very short time we filed into the board-room, where we were served with everything that man could desire to eat or drink. President Lamarche, in proposing the health of the Toronto Radiator Co., said that they were all delighted with their reception, and as unexpected joys were better appreciated, he could safely say that the Safford Co., both in the way of radiation and entertaining, could not be surpassed.

Continuing our drive down Dufferin street to Exhibition Park, where the great Victorian Era Exposition is to be held in September, and on our return trip, through the kindness of Mr. Carrick, an inspecion of the extensive and well equipped show rooms and shops of the Gurney Foundry Company on King street was made. Quite satisfied with our pleasant afternoon's drive, we returned to our hotel to take a short rest before the banquet.

On assembling at Harry Webb's parlors shortly after eight o'clock, we were received in royal style by the entertainment committee and by a large number of the local master plumbers, when the good hand of fellowship was extended to us. The menu card was very prettily gotten up, and contained a complete list of the good things fit for a king, the toast list being included. Mr. W. J. Burroughes, president of the Toronto Master Plumbers' Association, occupied the chair, and around him were seated Mr. Jos. Wright, president-elect of the National Association; Dr. P. H. Bryce, secretary of the Provincial Board of Health; Mr. S. G. Curry, vice-president of the Association of Architects; Ald. Scott, representing the mayor; ex-president Lamarche; Messrs. Edward Gurney and W. H. Carrick, of the Gurney Foundry Co.; A. G. Booth, of the Steel-Clad Bath Co.; A. A. McMichael, of the James Robertson Co., and other prominent persons. Mr. W. J. Burroughes occupied the chair.

The first toast on the list, "Her Majesty the Queen," was proposed by the chairman, and responded to by all joining in the singing of the national anthem, "God Save the Queen," with a three times and a tiger. "Canada, the Land we Live In," was responded to by Dr. Bryce in a very able speech. Mr. George Grant sang in his usual good style "The Land of the Maple." "The Mayor and Corporation" was responded to by Ald. Scott, who bid us all a hearty welcome. "The Supply Trade of Canada" was proposed by Mr. Fitzsimmons, who coupled with it the names of Messrs. Gurney, McLaren and McMichael. Mr. Gurney in responding, gave the association good advice, and said if they would always do the right thing they had no better friend than himself. Messrs. McLaren and McMichael also responded. "Our Guests—the National Delegates and Visitors" was the next toast on the list, and was acknowledged by ex-president Lamarche, in his usual happy style, and Mr. S. G. Curry, of the Ontario Association of Architects, all joining in singing "They are Jolly Good Fellows." The toast of the "Local Master Plumbers" was responded to by Messrs. Joseph Wright and J. B. Fitzsimmons. Coupled with the toast of the "Entertainment Committee" were the names of Mr. Anthes, of the Toronto Foundry Co.; Mr. Adam Taylor, of the Toronto Radiator Co., and Mr. A. G. Booth, of the Steel-Clad Bath Co. The toasts of "The Press" and "The Ladies" were accepted in a very hearty manner.

During the evening Messrs. Curran, Rich, Ramsay, Carrol, Grant and several others entertained us with songs and recitations which were very much appreciated.

According to previous arrangement most of the delegates and their friends were at Yonge st. dock in good time on Saturday morning. The majestic steamer "Chippewa" soon had the delegates on board, and we had a very pleasant sail across Lake Ontario. Old Niagara town was reached after two hours' sail, and after a few passengers had disembarked, we steamed up the beautiful Niagara River, with its swift running waters and high banks, and landed at the historic village of Queenston, memorable as the place where Sir Isaac Brock lost his life in 1812.

Electric cars were in waiting, and in a short time we were ascending the mountain side. Erected on a high point is Brock's Monument, from which, it is said, the city of Toronto, forty miles away, can be seen on a clear day. A short stop was made at the Whirlpool, and from the high banks which rise to a height of 250 feet, can be seen the great whirling eddies in their mad endeavors to get away from the vortex. Continuing our course, we passed the Whirlpool Rapids, and in a short time reached the town of Niagara Falls, with the cantilever and suspension bridges crossing the river in close vicinity. Entering the electric cars, we skirt the edge of those beautiful rapids above the falls in all their turbulent grandeur, passing on to the Dufferin Islands with their shady nooks and quiet retreats.

On our return to the falls luncheon was served to us in the Dufferin Restaurant. Our new president, Mr. Joseph Wright, occupied the chair. On his left was ex-president Lamarche, and on his right Mayor Cole, of Niagara Falls, who, being a plumber himself, felt quite at home among his fellow craftsmen. Toasts were proposed and drunk with much enthusiasm, but as one of the speakers said that to be in a hall making a

speech when so mavy points of interest were to be seen, was to him infamous, a hasty adjournment was made. The members of the Entertainment Committee formed little parties, so as to be better enabled to see all that was to be seen in the short time at our disposal. I was fortunate in being invited to join the party of Mr. Adam Taylor, of the Toronto Radiator Co., who had twenty-six under his guidance. The first point of interest visited was the Incline Railway, by means of which we descended to the river below, to embark on the steamer "Maid of the Mist." Mayor Cole introduced us to the captain, who, having been a plumber in the past, did his best to make our stay with him as pleasant as possible, and gave us what is not considered on the programme, a trip up to the very verge of the falling waters. Many were the points of interest visited, after which most of the party returned to Toronto on the steamer "Chippewa."

NOTES OF THE CONVENTION.

The eastern contingent are said to have come to the convention well provided with overcoats and mits. The weather, as well as their reception, was sufficiently warm to render these unnecessary.

We are requested to mention that through inadvertance the name of a member of the joint committee on entertainment, Mr. M. P. Huffman, was omitted from the invitations to the banquet and excursion.

After Mr. Hughes had delivered a somewhat lengthy speech in French, much to the amusement of the delegates, Mr. Burroughes suggested that they have it phonographed, in order to give the members an opportunity of studying it.

Many enquiries were heard regarding the welfare of the Hamilton association. Strange as it may seem, a representative was not present at the convention. Probably the new president will be successful in inspiring new life into the members.

It speaks volumes for the energy of the maritime province representatives that they should travel over 1,000 miles to attend the convention. However, the eastern plumbers have the enviable reputation of possessing a fair share of this world's goods.

Mr. H. W. Anthes, of the Toronto Foundry Co., was an enthusiastic entertainer. He had the pleasure of introducing the New York delegate, in the person of a yellow kid on card-board pinned on his back, on which was the inscription "I'se de New York delegate of this convention. See!"

The Reception Committee, upon whom devolved the work of arranging for the entertainment of the delegates, was composed of Messrs. H. W. Anthes, chairman, A. G. Booth, secretary, A. A. McMichael, W. J. Burroughes, A. S. Purdy, Adam Taylor, Jos. Wright, M. P. Huffman, J. B. Fitzsimmons, and J. H. Wilson.

Mr. Mansell, the new secretary, will of course be expected to maintain the high literary tone imparted to the correspondence of the office by his able predecessor, Mr. Hughes. Mr. Mansell's aquaintance with the classics will doubtless enable him to do this, while no one will question his ability to perform in an equally satisfactory manner the various and arduous duties of the position.

At the banquet probably the speech of the evening was made by Mr. Edward Gurney. Among other good things he said: "We have had a peculiar experience during the past five or six years. If you go down in the Southern States and throw down a nickel among the darkies, what a beautiful fight you will see. Well, that is just the way with the plumbers. There has been one dollar upon the ground and forty persons struggling for it, and the one who can make the longest and strongest fight secures it. Such has been the extent of competition. In Canada we have scarcely known whether we had a destiny or not. We scarcely knew whether to look to the east or the south, but as the result of late experiences we have ceased to look south and are turning our attention to the Motherland."

Mr. J. H. Doody relates with much relish one of the features of the recent Jubilee celebration in St. John. The city authorities there have had untold trouble with harbor improvements now in course of construction, a collapse occurring after the work was well under way. It was arranged that in the procession there would appear a large dredge drawn by twelve horses and operated by steam. Every time the bucket went down it would contain an alderman on the return trip, an intimation that he had been picked up from the bottom of the harbor, where he was supposed to have been working on the improvements. This was continued throughout the entire procession, and is said to have been thoroughly enjoyed by the spectators who were acquainted with the inwardness of the situation.

WORDS OF APPRECIATION.

Mr. W. S. Williams, Dundas, Ont., in renewing his subscription to the ARCHITECT AND BUILDER, states that he derives much benefit from the journal.

The Metallic Wire & Roofing Co., of Milton, Ont., have their factory in running order for the production of metallic shingles, sidings and tin stampings.

Messrs. F. B. Dakin & Co., Iberville, Que., announce that they have transferred the sales of their sanitary goods to the Sanitary Supply Co., 62 Victoria st., Montreal.

Mr. J. E. Bate, Scotch Block, Ont., reports a very successful season's business in building stone, curbings, etc., shipping to all parts of Ontario from his quarries at above place.

The Mexican Consul-General, Mr. D. A. Ansell, is desirous that Canadian architects should respond to the invitation of the government of Mexico to submit plans for new legislative buildings in the city of Mexico, to cost $2,000,000 in gold.

The Master Plumbers' Association of St. John, N. B., have elected the following officers: Thomas Campbell, president; Henry Dunbrack, first vice-president; Hamilton Kitchen, Fredericton, second vice-president; Wm. Kiley, secretary-treasurer.

By means of an iron rubbing wheel, tests were recently made in Philadelphia of the wearing qualities of various kinds of flooring materials. India rubber tiling stood the test to the best advantage, showing only 1-64 of an inch wear after an hour's rubbing. English encaustic tile and granolithic were next in point of durability. White and yellow pine were equal in quallty, both being superior to oak.

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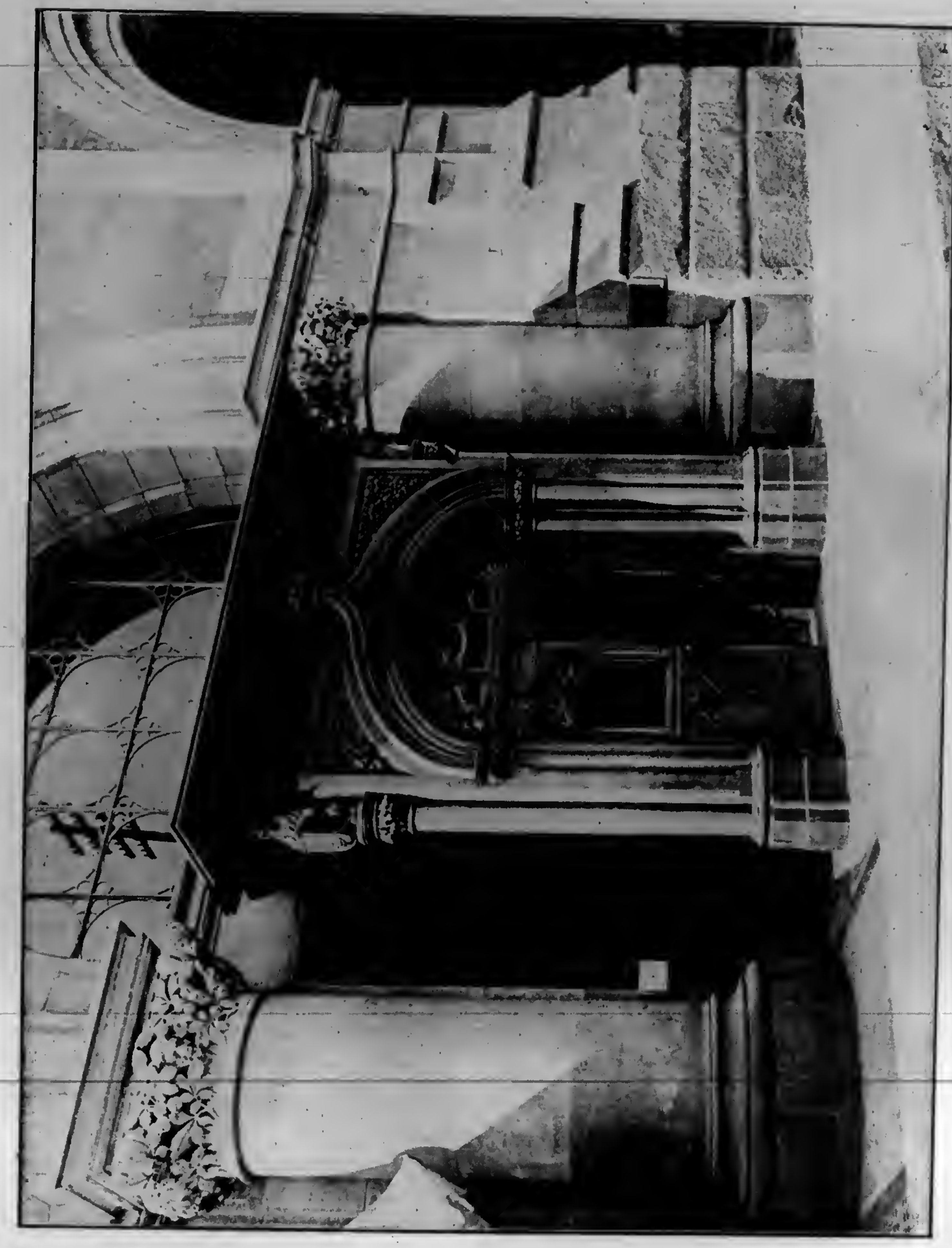
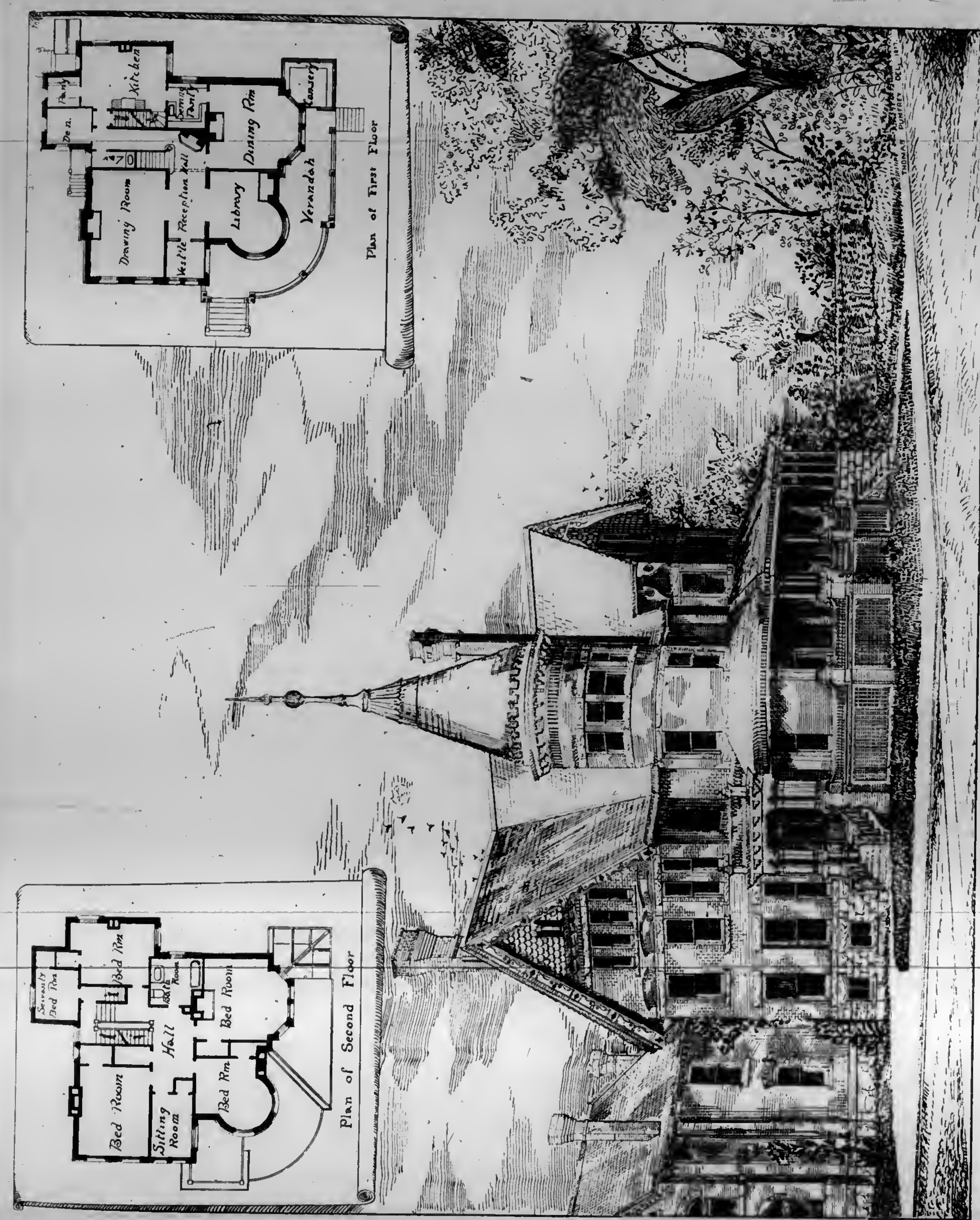
NATIONAL ASSOCIATION OF MASTER PLUMBERS OF CANADA—DELEGATES AND VISITORS.

SECOND ANNUAL CONVENTION, TORONTO, JULY 1ST, 1897.



PORCH OVER ENTRANCE TO CONFEDERATION LIFE BUILDING, TORONTO.
J. WILSON GRAY, ARCHITECT.



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—THE—

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ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

The Manufacture of Paving Brick. THE rate at which brick for pavements is growing in favor in Toronto can be gauged by the fact that the local paving brick factory is unable to keep up with the demand. In consequence, the construction of brick pavements is at present at a standstill. It is understood that the manufacturers are taking steps to greatly increase the capacity of their works. If other cities and towns, following the example of Toronto, should adopt brick as a paving material, as doubtless they will, there will be room in Canada for several paving brick manufactories.

New Parks for Toronto. THE Mayor of Toronto has recently announced the terms upon which additional park lands can be procured in the north-west and north-east sections of the city. Except in one instance, these terms would appear to be advantageous. The one exception is the offer by Mr. Manning of land on Palmerston avenue. A park in this locality is no doubt desirable, but not at the price of $5,000 per year for the land alone, to which must be added the cost of tree planting, fencing and other improvements. If such an expenditure is contemplated, it might with much greater advantage be made on the purchase and improvement of the proposed Victoria Square, at Queen and Bay streets, opposite the new city hall. A square in the heart of the business district is certainly the city's greatest need in the way of extended park area.

Public Bathing Facilities. AMONG the many public improvements which are being undertaken and carried out in Toronto at present, none are more urgently necessary than public baths. Many years ago Mr. Erastus Wiman erected, at the eastern extremity of Toronto Island, public bath houses, which he presented to the city. For some reason, probably the inconvenience and expense of getting to that part of the Island at that period, these baths after a time fell into disuse. Since then the Island has been made a very attractive resort, and the facilities for transport to and from the city greatly improved. There is no doubt whatever that if public bath houses were now to be erected and properly maintained on the Island, they would be largely used, especially by the poorer classes. In Great Britain these institutions are made self-supporting, and under proper management they would no doubt in a short time become so here. A very slight fee—so small as not to be in any degree prohibitory—would

suffice to cover cost of maintenance and perhaps interest on invested capital as well. When the street railway company's lines shall be extended to the Island, the cost of reaching the public bath houses would only be four cents, the price of a car ticket, from any part of the city. The sand bar on the west side would probably be the most desirable and convenient location. The City Council have this summer shown their recognition of the necessity of public bathing facilities by allowing boys under sixteen years of age to bath at this sand bar and providing boats for their free transportation to and from the city. This by no means fills the requirements. Proper facilities should next season be provided for all who may desire to avail themselves of them. The health of the citizens who are obliged through force of circumstances to spend the summer within the confines of the city demands that public bathing places should be provided.

Form of Contract. WE print in this number a form of contract prepared and in use by Messrs. Hewitt & MacLaren, architects, of Brantford, Ont. This contract is the outcome of considerable attention bestowed by these gentlemen and their solicitor on the subject of forms of contract. No new features of importance are claimed, but in the opinion of the framers this form embodies many of the most valuable features of American and foreign building contracts, and such as are believed to be best adapted to building contractors in Canada. As there are few subjects of greater importance to architects and builders than the construction of forms of agreement, we trust that the one to which we now call attention will receive critical perusal. Any criticisms which our readers may be disposed to make concerning it will be welcomed as well by ourselves as the compilers. A general expression of opinion on this important subject would be appreciated and would be certain to have a beneficial result.

Employment of Canadian Plant. WHILE the injustice of employing foreign workmen on works of contruction built by Canadian capital has received much attention of late, there is another important consideration which has been almost entirely overlooked, viz., the employment of plant of home manufacture. Particularly in the case of Government work, for which the capital is provided by the general public, should this matter be carefully watched, and a stipulation provided in the contract that, wherever possible, materials and plant of Canadian manufacture be used. In the construction of the Crow's Nest Pass railway, it is stated that Canadian labor has been given the preference, but on the other hand, the claim is made that a large portion of the plant being used on the work was manufactured in the United States. Some years ago it may have been necessary for contractors to purchase foreign plant, but with the improvements which have been made in manufacturing in Canada in recent years, this necessity has to a large extent been removed, and to-day we can compete favorably with the United States both in quality and price.

The eighteen year old son of Mr. J. Turner, plumber, of Winnipeg, was drowned in the Red river while bathing.

The master plumbers of Montreal recently closed their establishments on the occasion of the annual pic-nic of the Journeymen Union of Steamfitters and Plumbers.

REGULATION OF WAGES ON GOVERNMENT CONTRACTS.

A SELECT committee of the British parliament has had under consideration for more than a year the working of a resolution passed in February, 1891, to secure the payment of a fair rate of wages on government contracts, and its administration by the various government departments. The committee have prepared two draft reports, and are about to determine which of these should be taken as the basis for discussion. The chairman of the committee, the Home Secretary, has framed one of these reports, the other having been prepared by Mr. Sydney Buxton. The chairman has come to the conclusion that the departments, as a whole, have loyally endeavored to interpret and carry out the provisions of the resolution; but he does not deny that, in certain quarters there exists a great lack of confidence in the ability or in the desire of some of the departments to enforce its spirit and letter. Whilst, however, he does not consider this lack of confidence well founded, he thinks it important that the feeling should be removed, and to this he invites the committee to express the opinion that in some ways there is room for improvement, and that there might be greater promptitude and uniformity in the working of the resolution.

As regards such questions as how the current rate of wages of the district is to be discovered, how the area of a district is to be defined, under what conditions a contractor is entitled to ignore the district rate, the Home Secretary advises the committee not to lay down hard and fast rules, his suggestion being that each case should be decided on its merits by the exercise of common sense after careful inquiry. He does not overlook, however, the objects which the House of Commons had in view in adopting the resolution; and he asks the committee to endorse the recommendation of the Labor Commission that any agreements tending to regulate the rate of wages or the conditions of employment as between masters and men should be, as far as possible, encouraged and recognized. Other recommendations proposed by the chairman are that, where a sub-contract is allowed, the principal contractor should, as regards the carrying out of the fair wages resolution, be held responsible for his agent; that a list of the Government contractors, with the nature of their contracts, should from time to time be published; that contractors should in all cases be required to give no preference as between "unionists" and "non-unionists."

The alternative report prepared by Mr. Buxton recommends that there should be a uniform fair wages clause in all Government contracts; that every such clause should specify that the wages paid in the execution of the contract shall be those generally accepted as current in each trade for competent workmen in the district in which the work is carried out; that every such clause should state that, in the engagement and employment of workmen and others required for the execution of the work, no preference should be given as between "unionists" and "non-unionists;" that, when tenders are invited, a notice should be issued in every case drawing the attention of those who desire to tender to the fair wages clause in Government contracts; and stating that the department concerned will enforce the contracting firms to conform to the spirit and intention of this clause; and that any firm wilfully disregarding its provisions will render itself liable to be disqualified for further government employment; that all subcontracting without the leave of the department concerned should be prohibited; that sub-contracting should only be permitted where such sub-contracting is customary in the trade, and for work which the contractor in question does not himself perform in the ordinary course of his trade; that where a sub-contractor is allowed, the principal contractor should, as regards the fair wages clause, be held responsible for his agent; that a money penalty for breach should be attached to to the fair wages clause; that (where practicable) the text of the fair wages clause should be conspicuously affixed to the work in progress under the contract; that all cases of dispute in reference to the "current rate," and conditions of employment, and whether a particular contractor was or was not carrying out the terms of the fair wages clause in spirit and in letter, should be referred to the Labour Department of the Board of Trade for inquiry and for report to the Department concerned; and that a list of Government contractors, together with the nature and amount of their contracts, should be from time to time laid before Parliament and published.

ILLUSTRATIONS.

TERRACE OF DWELLING HOUSES AT PETERBOROUGH, ONT., FOR SIR SANDFORD FLEMING.—BOND & SMITH, ARCHITECTS, MONTREAL.

These houses are to be built on the new street that Sir Sandford Fleming is opening up through his Peterborough property. Each house will contain eight rooms irrespective of the attic. The first storey in front will be built with dark red common brick; above this will be shingles stained a light red in gables and elsewhere a yellowish buff. The woodwork will all be painted white.

The houses will be heated by warm air, lighted by electricity and gas, and have thorough sanitary arrangements; all pipes exposed and in bath-rooms nickel-plated.

THE DINEEN BUILDING, CORNER YONGE AND TEMPERANCE STREETS, TORONTO.—F. H. HERBERT, ARCHITECT.

The size of this building, which is being erected on one of the most important commercial street corners in Toronto, is 28 ft. 2 in. by 100 ft., four stories and basement. It is built of cream pressed brick with Ohio stone trimmings. Messrs. Dineen will occupy all Yonge and Temperance street frontage, including high basement, with two-story showroom and workshops in the rear. The upper three stories of main building will be sub-divided into twenty convenient offices. The building will be steam heated throughout and wired for incandescent lighting. The entrance to offices will be on the Temperance street side, and means of access will be provided by a modern electric elevator built by the Sprague Elevator Co., of New York. The entrances, halls, doorways, etc., will be laid with Venetian mosaic in suitable designs, and the sidewalks on both streets out to curbs, and all fanlights, will be glazed with Luxfer prisms. The finish throughout will be in natural hardwood.

CHURCH OF THE MOHAWKS, BRANTFORD, ONT., ERECTED 1874, AND COMMUNION SERVICE PRESENTED BY QUEEN ANNE.

This is claimed to be the oldest church in the province of Ontario, and is therefore a subject of archæological interest. It is situated two miles from the city of Brantford, and is built of wood, with the exception of a recently constructed brick chimney. The body of the church is covered on the outside with clapboards an inch thick, which accounts for its excellent preservation. The entrance is through a square tower, on one side of which is the vestry and on the other a vacant room of equal dimensions. Above this tower rises a graceful shingled spire with iron finial. The inside of the structure is very plain and is seated with high backed benches.

The communion plate, which appears in the illustration, bears on its rim the following inscription: "The gift of Her Majesty, Anne, by the grace of God of Great Britain, France and Ireland, and of her plantations in North America, Queen, to Her Indian Chappel of the Mohawks."

THE HISCOX BUILDING, LONDON, ONT.—MCBRIDE & FARNCOMBE, ARCHITECTS.

The building has a stone foundation up to ground level, the basement containing the steam and hot water heating apparatus, lavatories, store rooms, &c. The ground floor is built of Berea stone and contains the Bank of Toronto offices, with entrance at corner. The banking rooms and manager's office are finished with birch fittings and panelled wainscot, furnished by the Canadian Office and School Furniture Co., of Preston, Ont., tile floor, laid on terra cotta arches and steel girders. The ceiling on this floor is executed in staff, being panelled with moulded and panelled beams, dividing the panelling. The mouldings, corbels, &c., are enriched, and the whole decorated to give an old ivory effect. The walls are also finished in colors to correspond with the other finish. The other portion of this floor is divided into two offices, main entrance, staircase and elevator space to upper floors. The first, second and third floors are divided in offices, with vault accommodation for each floor. These floors are also finished in birch and the outside walls constructed of Beamsville pressed brick with terra cotta trimmings; a copper cornice completes the top portion of the building. The third floor contains, besides offices, lavatories for ladies and gentlemen, and all offices are reached by an electric passenger elevator, built by Leitch & Turnbull, of Hamilton.

The ceilings throughout are of embossed steel from the Metallic Roofing Company's works, Toronto.

The Bank of Toronto portion is heated by hot water, and the remainder of building by steam, the contractors being the John Ritchie Heating Co., of Toronto. The other contractors were: Martyn & Hammell, brickwork; A. Burnett & Son, cut stone; Wm. Tyller, carpenter work; Pritchell & Calhoun, plastering; H. & C. Colerick, painting and glazing; Wm. Stevely & Son, copper work; James Greenaway, plumbing.

The Roentgen rays have been employed with success in Germany to prove the authenticity of a painting attributed to Albrecht Duerer. It was a head of Christ painted on the wood, and supposed to have been executed in 1521; very dingy with age and probably "restored" more or less. After several efforts a photograph was successfully taken by means of the Roentgen rays, which revealed the features of the thorn-crowned Jesus, and the drapery about the shoulders, and the hands which grasped the latter, more distinctly than in the paintiog. There also came to light a Latin inscription in quaint Gothic characters, the monogram of some grand duke (for whom, perhaps, the picture was painted), the artist's initials and the date "1524," which date was accepted as the correct one. The photograph reveals the grain of the wood and the fibre of a silk handkerchief stretched on it.

THE USE OF STEEL IN THE CONSTRUCTION OF DAMS AND RESERVOIRS.

By John S. Fielding, C. E.

Tensile strength is required in nearly all materials used by engineers, and the utility of the article is in the majority of instances determined by this standard. In the members of a Pratt truss bridge the tensile strains predominate, and numerically about 60 per cent. of them are subject to direct tension, and 40 per cent. to compression. And yet, the compression members, while not being subject to tensile stress, nevertheless develop tensile stress in themselves, while engaged in transmitting stress of an opposite kind.

Even in stone work, such as a bridge abutment, it is necessary to have tensile strength, as the work of carrying the bridge and resisting the pressure of the bank or the current, although practically all compression, nevertheless develops tensile power through unequal loading, and a stone that is deficient in tensile strength is liable to prove to be a bad investment, by cracking and allowing unequal settlement or bulging of the wall.

In a stone dam of the usual construction, with a vertical face toward the pressure of the water, the tensile strength of the material determines the thickness of the wall and the shape of the structure unless the structure is made so excessively heavy as to resist by sheer inertia of its mass. But an engineer would be severely criticized who built everything so heavy as to ensure permanency by the great size and strength of the structure compared with the forces which could come against it and the work which it had to do. He must not waste material and money in any such scheme for the furtherance of his own credit for building for permanency. If he should do so his reputation would suffer, and his pocket also, for he would be seldom employed.

Great and small engineering undertakings are dependent upon an item that is not engineering, but is closely allied to it. I refer now to rate of interest upon investment; and, just as the money lenders of Europe can prevent nations going to war by withholding from them loans of money, so does the rate of interest which can be expected upon an engineer's contemplated expenditure, have the deciding voice as to whether he shall or shall not proceed with the undertaking.

In this way the engineer is beholden to look about him for a material or materials that will enable him to perform certain work in a way that will fulfill the duties required of it, and at the same time satisfy the chief clerk of the works, viz., rate of interest upon investment, that a proper return can be got out of the use of the article.

Stability and permanency are necessary to do this with any degree of success, so that as a general rule the best materials at hand are the most economical, and if any saving is to be effected, it can best be done by the efficient use of good material. In this connection we are brought back to the opinion expressed at the beginning of this letter, viz., that a good material for engineering purposes is usually one possessing tensile strength in a high degree.

Timber is a more useful article to an engineer than stone or concrete because it can be used where great tensile strength is required, and stone or concrete cannot be so used. If concrete could be made that would develop a tensile strength of thousands of pounds per square inch instead of only hundreds, it would be a much more valuable and reliable article for the uses of the engineer. The material par excellence for the engineer is undoubtedly "open hearth" or "Bessemer steel," and after some years' use of, and reliance upon this material, one gets to feel that no matter what work he may have in hand, if this material could be used, he would be able to estimate just what to expect from it, and to say exactly what it would cost to construct.

It is probably with such feelings actuating me that I have accepted the idea that steel is the proper material with which to construct a dam or reservoir. One objection that may be urged against this is the fact that water is very antagonistic to steel, through developing corrosion, but there cannot be as much in this as appears at first sight, for why use iron water mains or steel bridge piers or even steel ships, steel lighthouses, steel piles, such as have been used at Brighton Pier and other places on the sea coast in England and America.

If, then, water and steel may be allowed to meet, we may discuss the designs.

First, for a reservoir—Reservoirs are simply a means of impounding water at a point or situation where natural means are wanting upon two or more sides, and probably all four sides, being different from a dam which impounds water upon one side and holds back a body of water with the assistance of natural walls upon other sides.

It this way it is like a bowl or basin, and why can it not be built like such, and of a material that will exert tensile strains? A bowl or basin of circular form filled with liquid can have no strains caused by unequal loading, since water transmits pressure equally in all directions.

An earthen reservoir depends upon its thrusting strength to hold back the water, but this strength is about nil if water gets under its bearing surfaces, which may occur if the inner coating of asphaltum or other material admits of the slightest leakage. When this occurs the earthen dam is like the man pushing a weight with a banana peeling under his shoe. The stone dam is in a similar category, because neither of them can exert material tensile strength and their strength is not self-contained, but is dependent upon outside conditions.

But consider a reservoir built with a steel circle or rib running horizontally, on a level with the top of the water, another rib in a horizontal plane five feet below it, another five feet below No. 2, and each one describing a smaller circle—these horizontal ribs to be connected by means of curved ribs in a vertical plane, and the whole being a skeleton frame of the bowl, to be filled in with a wall of concrete. Would not such a reservoir be of such strength that its stability could be depended upon, and its strength determined without reference to outside conditions, such as the action of moles, muskrats, frost or soakage.

In regard to cost, it would appear that any size of reservoir could be built with a very thin wall of concrete if the concrete were bound with such steel bands, and the thickness of the concrete would not he increased materially for even a deep reservoir—the amount of steel being varied to suit the stresses caused by the volume and head of water, the thickness of the concrete being made to suit the spacing of the steel bands only.

Such great care would not have to be exercised to keep this basin tight, as its strength would not be dependent upon this. Soakage through the concrete would have to be taken care of by providing underdrains to carry it away.

Now, in the case of having to build a dam, it seems to me a strange thing for the engineer to have the choice of a great many different formulæ for the strength of the wall he intends using or for the size of wall he should use; also a great many different co-efficients (all by prominent authorities) for the friction of earth upon earth, stone upon stone, or stone upon earth, etc., etc., and these changing constantly upon the assumed conditions being changed. It is easy to imagine an engineer pondering over what row of decimals he should use for safety, and which row of decimals would bring the cost out to an amount that would admit of the work going on; then, in the end doing as was done recently for an important work, make miniature models and subject them to miniature freshets, and go on from there. It looks to me as if that sort of work cannot be called an exact science.

Take again the case of a recent partial failure of a dam, where large stones were moved, having let go at the cement joints now that may appear to be all a case of weight and sliding friction as opposed to a pressure of rushing water, but I think it could more properly be ascribed to a weakness of tensile strength in the materials at the up stream face, or the outer fibres of the structure. The cement joints, being but partially set, gave way at a low tensile stress, and the water getting under the bed of the stone soon moved it. If there had been a tensile strength of 600 pounds instead of probably 200 pounds per square inch in the cement joints the wall would have undoubtedly stood; how much more secure then would it have been if the tensile strength were 6,000 pounds?

To get a tensile strength equal to this or even to be worth calling a tensile strength, we have to use metal, and steel is the best article.

A dam is not like a reservoir, for it may be subject to unequal loads. During flood time a greater depth of water at one point or a concentrated blow by a log, or even the increased velocity at centre of the stream, will all cause unequal loading. If the nature of the foundation subsoil varies, so as to give a better co-efficient of friction at one point than at another, and the putting together of the stones is more carefully done in one part than in another, we have then only to assume the defects in strength named, and the increase in pressure named to be merged in one point to have a case of very unequal loading, and, it appears to me, that in the case of a wall not having a large factor of safety over and above what would be required at the point of the greatest stress, movement of some amount would take place, and if any movement took place the wall would be permanently weakened.

Now, assume that at the point named the stress approaches the limit of strength—the only thing that can help that point will be tensile strength on one face acting in conjunction with compressive strength on the opposite face, transmitting part of its load along the portions of the wall that may not be so hard pressed by the current, and may be stronger and better bedded. It is hard to see where tensile strength sufficient for this purpose can be got without recourse to metal.

A great deal could be said in regard to this matter of unequal loading, but I will simply state that I would consider a dam to be the same as unequally loaded, even if the pressure along its face were uniform, if its power of resistance varied, and this condition becomes dangerous if the variation in power of resistance is considerable.

In regard to a steel dam, let us assume a structure placed upon a river bed of hard impervious clay. By the use of steel this can be made to be practically all of one piece, being precisely the same as if we could get one of the huge trees of the western coast, and after hewing it to a size of say 30 square feet and the full length of the dam, say 120 feet, we could lay it across in the bed of clay and attach it to either bank in a thorough manner, and thus impound the water. It is quite evident that this dam would not break, but would have to be carried away bodily before it would yield. Its strength can be in two directions, viz., refusal to change its shape in a horizontal plane, and refusal to change its shape in a vertical plane. If it is anchored in such a way as to prevent its rising, or is made of such a shape that the water will help to hold it down, it will have stability. Now, let us place a steel truss upon the bed of the river, with its greatest strength in a horizontal plane and imbed it thoroughly with clay and concrete, and upon this truss erect another one on its centre, then complete these by sloping sides vertically, as shown in diagram 1.

Plank over the tops of these slopes, having first filled in on top of concrete base with stone or earth to any height desired. There would then be a dam that could not fail from any action of muskrats or moles, or from the starting of a small leak carrying away a part, and then more and more until it collapsed entirely and let go all the water.

A dam such as this, so well provided with strength in tension planes, could only be pushed bodily from its position. The problem then becomes one of head and force of water as against inertia given to the dam in the simple design of its dimensions, resulting in a certain total weight of materials and the friction upon the clay. The weight of the shore cribs up and down stream would also be available in this sum since the dam itself would be attached securely to them.

It is my belief that a dam so constructed would be permanent beyond any doubt, and if the shore cribs were carried the proper distance up stream and the usual precautions taken to puddle behind them and under the whole structure, so that it would always be tight, an extraordinary freshet would have no more effect upon it than an ordinary one. This dam could have a row of piles at intervals of 20 feet apart, to be anchored to, at what would be practically the panel points of the flat truss, so that if the assumed co-efficient friction of the mass in the clay should not be correct the piles would hold it. But an ideal dam would be one that could be examined at intervals and a positive opinion obtained as to whether it was absolutely tight or not, and if leaking on the up stream face the water should be intercepted before it could get underneath all of the dam. Thus a good co-efficient of stability could be relied upon for the lower portion at least. To do this lay down a truss and imbed it on the clay and fill in with concrete, leaving a trench down the centre. (See diagram 2.)

This trench could be lined with porous material, and if the upper portion of the dam A leaked, it would intercept the water. Now, upon this erect two concrete walls, one over A and one over B, and imbed a light system of vertical and diagonal bracing in each, these to connect with the flat imbedded truss, and also to a similar truss at the top. We would then have a section like diagram 3.

Now, we may also connect B D and A C with light diagonal bracing and put in cross walls of concrete E E. The space can now be filled in with earth, and the top planked over with earth or paved with concrete.

There should be a layer of silt or gravel extending completely across the inside filling leading to tile drains and emptying outside the wall on down stream side, m n x, so as to intercept any water getting over the top of the dam at flood time, or soaking down during rain falls. All that remains to be done is to build suitable abutment walls in either bank and connect to them in a way to give maximum strength, provide spillways, etc., and then carry the main drain M to any suitable point where it can always be ascertained if water enters. To ensure a small quantity finding its way to the extreme end the lower portion of this drain should be of iron, and it should be given a fall.

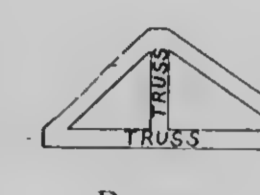


Diagram 1.

Diagram 2.

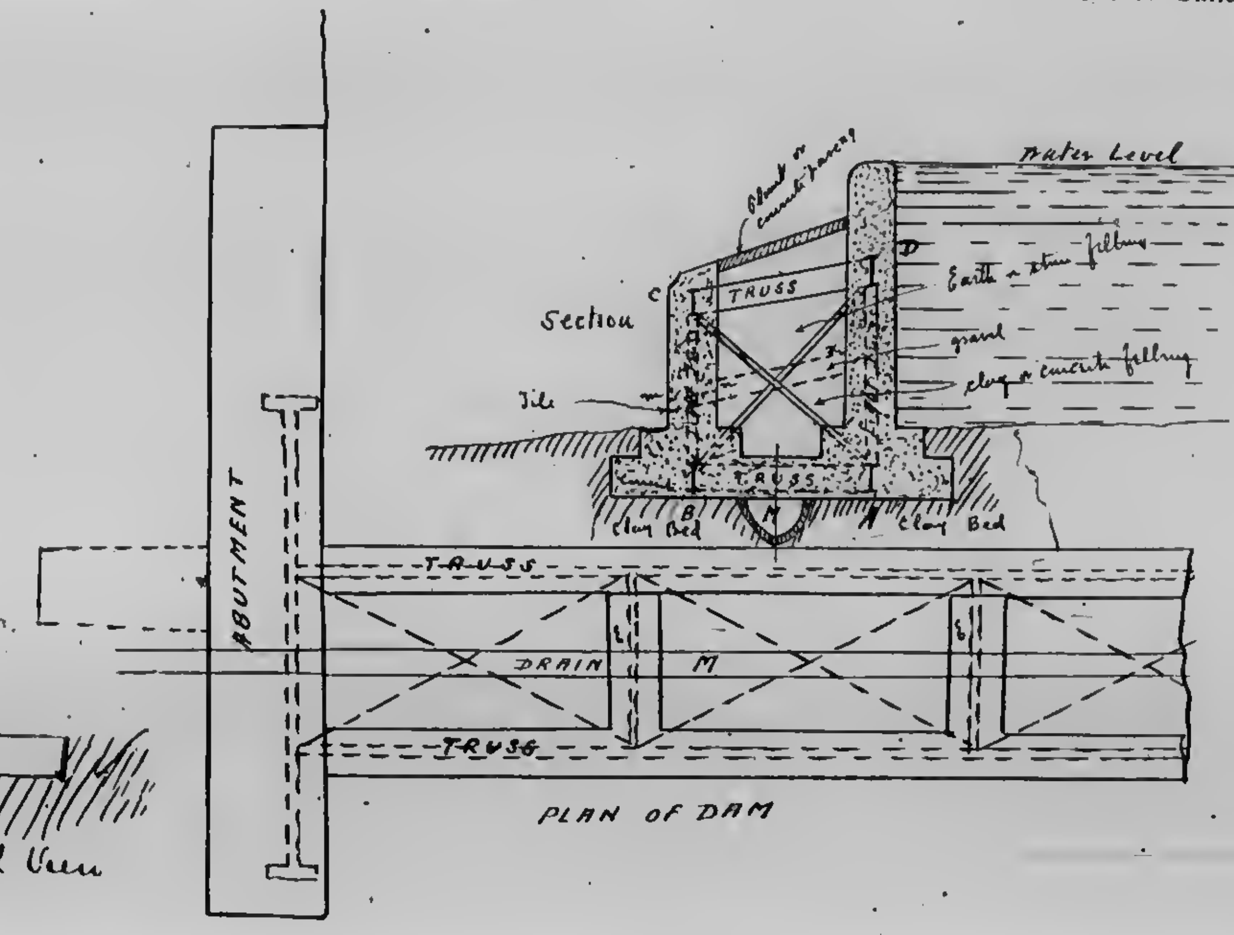


Diagram 3.

If it is found that water enters, we will know then that the co-efficient of friction for portion of wall A is at the minimum, but that for B will be a maximum until the water rises to the top of the drain. This could be prevented by pumping or providing drainage to some lower point. If it should get full, however, it would be a signal for lowering the head of water and thus reducing the pressure on the foundations of the dam.

This design of dam could be used for any height required, also for any length. To go into all the rules or assumptions that would be best to adopt for different cases would take up too much space for this article. I would say, however, that this construction should not cost any more than a masonry or earthen dam of usual strength, and should be more reliable and stronger than could possibly be obtained in masonry or earth, and the one feature of possessing tensile strength in a high degree should recommend it to the theoretical and practical engineer alike.

Messrs. Clare Bros. & Co., of Preston, Ont., have issued a catalogue of their new hot water heating system, containing descriptions and illustrations of the Preston boiler and patent steel radiators. Persons interested in heating apparatus should write the company for a copy.

IMPRESSIONS OF A VISITOR.

MR. Edward Swales, architect, of Doncaster, England, some of whose charming sketches appeared in the pages of this journal a few months ago, is at present on a visit to the United States and Canada. He has expressed himself as being pleased with much of what he has seen of Canada and Canadian architecture. The latter impresses him as being more substantial in character than that of the United States. The new city buildings, now nearing completion in Toronto, and several of the large modern buildings, elicited his praise. He referred in complimentary terms to the pleasing effect stone produced by carving in low relief which is characteristic of American architecture, in contradistinction to the style of heavy undercutting and high relief which obtains in Europe. On the other hand he found ground for criticism in the total disregard of scale exhibited in the design of many of our buildings, the finials on which were a source of amusement, owing to the abrupt manner in which they are made to terminate in a flattened knob, or spread out to huge dimensions. Mr. Swales remarked that thus far he had seen very little good gothic work on this side of the water. It is his intention, before returning to Europe the latter part of September, to visit the western States, and to winter in Spain.

THE VICTORIAN ERA EXPOSITION.

THE approach of the opening day of the Victorian Era Exposition, which commences this year on August 30 and lasts till Sept 11, is deserving of more than passing attention. By no other feature of its civic life is the city more widely and favorably known than by this annually recurring exhibition of the products, the resources, the capabilities of our country and people. It is popularly known as Canada's Greatest Fair, and the title does not belie its scope and comprehensiveness. The little affair which started with local aims assumed provincial proportions and then continued to spread until it is now entitled to be looked upon as a Dominion affair. Especially so is it the case with this exhibition, which in the value and number of its exhibits, the attractiveness and scale of its many entertaining features, far surpasses any preceding exposition. Take only one feature, the Jubilee parade, a replica of the scene which took place in London. Everything will be exactly the same as in London on June 22. The escort of colonial and British troops, the Indian Princes, the Princes and Princesses of the royal family, Queen Victoria, her carriage, state trumpeters—everything will be an exact reproduction of the London pageant. An idea of the scale upon which this feature will be presented can be gathered from the fact that the frame work and structure of St. Paul's Cathedral and Buckingham Palace is over 650 feet in length and runs up to 80 feet in height. Take again the tableaux of historical events during her majesty's reign; they cover hundreds of feet in area. These features are more than entertaining, they are educational. They enable Canadians to grasp the immense size of the British Empire, and great variety of races bound together by the same ties of loyalty to the one institution. They also give a vivid idea of the might and pomp of the empire and well illustrate the meaning of that phrase, "Hands across the Sea," words which in this Jubilee year possess so much significance to the people of the Anglo-Saxon race. Add to these the great variety of the objects displayed, from the minerals of British Columbia to those of Nova Scotia, from the products of the west to those of the east. Visited in a proper spirit the fair is more than an exhibition, it is a source of instruction, for there one can see and appreciate in a short time the great extent, value and variety of Canada's resources.

COST OF SOLOMON'S TEMPLE.

Few people, even in these days of palmy extravagance and millionaire display, have any adequate impression of the gigantic cost of the great temple of Solomon. According to Villalpandus, the "talents" of gold, silver, and brass were equal to the enormous sum of £6,879,822,000. The worth of the jewels is generally placed at a figure equally as high. The vessels of gold, according to Josephus, were valued at 140,000 talents, which reduced to English money (as has been shown by Chapel's reduction tables), was equal to £575,296,203. The vessels of silver, according to the same authorities, were still more valuable, being set down as worth £646,344,000. Priests' vestments and robes of singers, £2,010,000; trumpets, £200,000.

To this add the expense of building materials, labour, etc., and we get some wonderful figures. Ten thousand men hewing cedars, 60,000 bearers of burdens, 80,000 hewers of stone, 3,300 overseers, all of which were employed for seven years, and upon whom, beside their wages, Solomon bestowed £6,733,970. If their daily food was worth 50 cents each, the sum total for all was £63,877,088 during the time of building. The materials in the rough are estimated as having been worth £2,545,337,000.

STEEL MANTELS.

ONE of the newest improvements in the construction of dwellings is the steel mantel, which is just being introduced to builders. In these all the surface below the slab is composed of 20-gauge wrought steel, pressed into any desired shape or style by heavy machinery. The outside surface of this is enameled to imitate any wood or marble, and the character of the enameling is such that it withstands all changes of temperature without injury. Many advantages are claimed for these mantels besides their economy. First is the decreased weight, as compared with slate or marble mantels, which they take the place of. One of these weighs 400 pounds, while one of steel weighs only 100, which includes 70 pounds for the slate slab, which is supplied with the metal mantel-pieces. When these are set up and backed with sand or ashes the difference is more difficult to detect, as tapping it with the finger or hammer makes the same noise as solid stone or wood. These mantels hold their shape as a house settles, as there are no joints to part. They are also recommended from a sanitary standpoint, as they harbor no dirt or vermin, and they even act as a radiator of the heat instead of absorbing it. The fact that they are fireproof is also an argument in favor of the steel mantel's use. In order to secure fancy effects uprights are sometimes demanded on either side to support the mantel-seat. In this case they are made of wood, and these posts, as well as the slate slabs, are subject to the same process which the metal work has undergone, so that the tone of the wood, metal and the material which enters into the construction of these mantels are all the same.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

COMPETITIONS.

THE importance of inviting competitive designs for public buildings is not recognized to the extent desired, as evidenced in the case of the Longue Pointe asylum and the proposed new civic building. Regarding the latter, a protest against the manner in which the design was obtained has been entered by the Province of Quebec Association of Architects, and is now before the city council. A system of competition among qualified architects is undoubtedly the most satisfactory, and the beneficial results obtained by the employment of the best artistic skill should not be underestimated. Public buildings are the property of the citizens, and should be open to public competition. Such competitions, however, should be conducted under proper conditions, and only persons of unquestionable ability appointed to act as judges. Then will the superiority of architecture predominate and the standing of architecture be raised to its proper level.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The semi-annual examinations for admission to study of architecture and for registration were held on the 28th, 29th and 30th of July last, in the rooms of the Province of Quebec Association of Architects, New York Life Building, at 10 o'clock in the forenoon each day. Only one candidate, Mr. W. A. Gagnon, of Westmount, presented himself for examination, he being successful. The examiners were Messrs. A. T. Taylor, Alex. C. Hutchison and Jos. Venne.

Although the date is not yet definitely decided, it is probable that the next annual meeting of the Quebec Association of Architects will be held about the end of September. The scheme for a Dominion Association, which has been pending for some time, will be discussed, also methods for the guidance of open competitions and several other subjects of importance.

ARCHITECTURE AT McGILL UNIVERSITY.

McGill University has issued its programme of classes for the season of 1897-98. The architectural department, as is well known, was endowed by Mr. W. C. McDonald, the founder, with a very complete equipment. A special architectural department has been added to the faculty library, for the use of students. In addition to a number of new works a collection of architectural photographs is being formed, also a complete series of lantern slides for the illustration of the historical courses. Models, specimens of materials, and fittings for use in the course on building construction, materials, sanitation, etc., heve been obtained. The museum of the engineering building possesses a large collection of sculpture casts.

The architectural department is under the supervision of Mr. Stewart Heubert Capper, M. A., A. R. I. B. A., A. R. C. A., as professor, and Mr. H. F. Armstrong as lecturer.

On recommendation of the faculty, the architectural and modelling classes will be open to women students.

Mr. A. T. Taylor, F. R. I. B. A., R. C. A., has given to the students of the architectural course a prize of $25, and Mr. A. C. Hutchison, R. C. A., three prizes of $12, $8 and $5, to be awarded to the three undergraduates taking the highest standing in the freehand drawing of the first year.

THE DIGNITY OF TRADE.

ON this subject Mr. Andrew Carnegie, the successful iron manufacturer, of Pittsburgh, Pa., says:

"If a young man does not find romance in his business, it is not the fault of the business, but the fault of the young man. Business is not all dollars, these are but the shell—the kernel lies within, and is to be enjoyed later, as the higher faculties of the business man, so constantly called into play, develop and mature.

The old prejudice against trade has gone even from the strongholds in Europe. This change has come because trade itself has changed. In old days every branch of business was conducted upon the smallest retail scale, and small dealings in small affairs breed small men; besides, every man had to be occupied with the details, and, indeed, each man manufactured or traded for himself. The higher qualities of organization and of enterprise, of broad views and of executive ability, were not brought into play. In our day business in all its branches is conducted upon so gigantic a scale that partners of a huge concern are rulers over a domain. The large employer of labor sometimes has more men in his industrial army than the petty German kings had under their banners.

I can, with confidence, recommend the business career as one in which there is abundant room for the exercise of man's highest powers, and of every good quality in human nature. I believe the career of the great merchant or banker or captain of industry to be favorable to the development of the powers of the mind, and to the ripening of the judgment upon a wide range of general subjects, to freedom from prejudice, and the keeping of an open mind. And I do know that permanent success is not obtainable except by fair and honorable dealing, by irreproachable habits and correct living, by the display of good sense and rare judgment in all the relations of human life, for credit and confidence fly from the business man foolish in word and deed, or irregular in habits, or even suspected of sharp practice. The business career is thus a stern school of all the virtues.

FOREIGN MARKET FOR CANADIAN BUILDING STONE.

MR. E. Odlum, writing to the Toronto Globe on the further development of the foreign trade of Canada, says: "As granite, marble and various ornamental stone are imported from many countries, and as Canada is rich in numerous varieties of high grade stone, there would seem to be an opening for trade along this line. The fact that Canada imports stone need not prevent an earnest, systematic, persistent attempt to export similar articles. I know many excellent granites, marbles and free stones in Conada that could be exported as ballast. In bulky, light cargoes ballast is required, and if well managed that very ballast might be used as valuable building and ornamental stone."

An Ottawa contractor named Stubbs is said to have taken his departure for parts unknown.

The end of the famous suit between the Great Northwest Central Railway Company and its contractor, Alphonse Charlebois, came with the recent decision of the privy council. The judgment of the privy council reverses that of the supreme court of Canada, and declares that the consent judgment for $622,000 given to Charlebois by the railway company is invalid. This consent judgment was secured by Charlebois, presumably for work done on the road, for which he was the contractor, and of which he had been one of the directors.

FORMS OF CONTRACT.

REGARDING the subjoined form of contract, the compilers, Messrs. Hewitt & Maclaren, architects, Brantford, Ont., write as follows :

"With the numerous forms of contract extant, it seems superfluous to add another to the already long list. In our practice some slight modifications were deemed necessary to suit all classes of owners and contractors. The points to which we more especially call attention are the following, namely : The completion of the work of all trades before any contractor can receive his drawback ; the itemized schedule of time limit showing when each contractor will complete his work. This list saves the contractor the trouble of coming to the architect's office to ascertain when one of the other tradesmen's time for completion is up.

"It is customary to only allow money payments when the materials have been fixed in the building. The delivery of a large quantity of lumber, bricks or other material on the owner's lot should entitle the builder to the same contract percentage as if it were established in the works, provided that the goods are intended for that structure.

"When the architect is receiving preliminary instructions care should be taken to have a carefully prepared skeleton list of the client's suggestions and requirements. This would overcome in a measure the much dreaded extras. When extras are ordered the architect should give a letter in writing stating the amount to be paid, and the extension of time if needed, or allow the contractor to submit a tender for these additional items and have the former countersigned by the owner and the tender countersigned by both architect and owner. In winding up the accounts the orders will be produced by contractor, and what would otherwise take hours to adjust could be certified to in a few moments. Another benefit from these orders is the fact that the architect cannot make the owner pay for more than his signature is attached to. Some clients are desirous of knowing how their money is being expended. In the commencement they willingly pay thousands of dollars for their work with but a casual inspection of the specifications, yet if called upon to settle for two or three hundred dollars of additional work, which the architect thought trivial, will make as a rule more fuss over the lesser amount than the former, although the value may have been greater and the comforts derived absolutely necessary to the completion of the building.

"Through the inability of the contractor to readily finance material or men, his creditors for their own protection institute liens. By reason of this shortsightedness it seems hardly just that the owner should be called upon to pay their law bills, hence the clause indemnifying the owner against liens.

"It frequently occurs and is convenient to employ two contractors of the same trade on one building. The original contractor deems it a hardship to have a brother tradesman doing what might have been his job, although the tenders gave the last contractor the work by fair valuation. The clause permitting the employment of other contractors may not always be exercised, but is for the architect a beneficial one.

"A debate nearly always arises on the question, who shall pay for and maintain the builder's risk and hold the policy. When the insurance is specified, a price is included for it in the contract. If anything is said about it, it is naturally presumed the owner buys. Whether it is included in the specifications or not, it is certain the owner, in any event, pays for it. Our contention is, that this item should not be included in the tender, but arranged by the owner at the time of signing contract.

"The architect in drawing his own contract, either on his private forms or those purchased from the law stationers, embodies therein the special points he wishes to emphasize. There could be no objection to allowing the client's solicitors to peruse and advise upon the documents and make such changes as their experience warrants.

"Some of the American printed specifications give a printed list of conditions. Our idea would be to combine the contract and the conditions under one agreement, and refer in the written specification to the fact that form of contract would be used. This method would avoid much unnecessary work.

"We cannot understand why the arbitration clause cannot be wholly eliminated. When disputes arise, the architect's opinion has been given – why not let the disputants place their grievances in the hands of their lawyers, where that class of trouble usually belongs and receives attention ?"

ONTARIO BUILDERS' CONTRACT.

This indenture, made this day of , one thousand eight hundred and ninety

By and between,

of the of , in the county of and province of Ontario (hereinafter called the contractor), of the one part,

and

of the of , in the county of and province of Ontario (hereinafter called the proprietor), of the other part.

Except where the context may require a different construction, the words "contractor" and "proprietor" respectively shall include and mean the executors, administrators and assigns of the parties respectively, and the words "the architect" shall include and mean any architect who may be substituted for the architect herein named, by notice in writing given by the proprietor to the contractor.

Witnesseth : That the said contractor, in consideration of the sum of $ dollars to be paid to him, doth hereby covenant and agree with the proprietor as follows :

First : That the said contractor shall and will, on or before the time and times hereinafter mentioned, in the year one thousand eight hundred and ninety , now next (18), well and sufficiently execute and perform, in a true, perfect and thorough workmanlike manner, the work of every kind required in the erection and completion of

for the proprietor, on lands and premises situate on street, in the of , in the county of , in the province of Ontario, agreeably to the plans, drawings and specifications prepared for the said works by , architect, and under the direction and personal superintendence of , architect, hereinafter called the architect, and will find and provide such good, proper and sufficient materials of all kinds whatsoever as shall be proper and sufficient for the completing and finishing of all the aforesaid works.

SCHEDULE OF TIME.

That the contractor or contractors will each and every one carry on his or their work with due diligence, so that the building may be handed over to the proprietor on or before the day of (18) complete in all respects, the following is the time allowed each trade respectively in which to carry out the work :

Excavation completed by..

Stone walls ready for the ground floor joists..........................

Brick walls ready for wall plate of roof rafters..........................

The building to be enclosed..

Roof shingled or slated and corniced..........................

The building to be ready for lathing on..........................

Plastering to be finished throughout..........................

The gas-fitting, plumbing, electric wiring, heating apparatus, etc., to work from time to time as required by other trades and complete within the schedule time..........................

Joiners' work finished..........................

Painting, etc., completely finished..........................

The slater, felt roofer, tinsmith, bell-hanger, painter or other tradesmen must have their different work done at such times as will not cause delay in having the work done as above ; and if delay does occur through the failure of any of the above to carry out his or their work, the damages for time so lost must be paid by him or them for causing same.

Second : The said proprietor doth hereby covenant, promise and agree to and with the said contractor, that the said proprietor, in consideration of the covenants and agreements herein contained on the part of the contractor, being strictly executed, kept and performed by the said contractor, will well and truly pay or cause to be paid unto the contractor the sum of ($) dollars of lawful money of Canada in the following manner :

per cent. to be paid fortnightly from time to time on account of the contract, and all additional work and all materials actually delivered on the ground or adjoining thereto for the purpose of said works, though not yet placed therein (to be property of the proprietor until the work shall be completed, and shall not be removed without the written consent of the architect), as the work shall proceed on the value of the same. The balance of the contract and all additional work (if any) to be paid within thirty days from the completion of the said works, according to the final certificate of the architect as hereinafter provided.

And it is further understood, that in case of several contractors being employed on the building, the work of no one trade is to be considered complete till that to be done by the contractor and workmen of the other several trades shall have been completed.

The contractor shall not be entitled to any fortnightly payment without a certificate from the architect to the effect that the work done and the materials they bring upon the said premises for the purpose of said works are in strict accordance with drawings and specifications, and that he considers the payment properly due ; said certificate in no way exonerating the total and final responsibility of the contractor, neither shall it exempt the contractor from liability to replace work if it be afterwards discovered to have been improperly done, or to pay all damages for work imperfectly done which the architects shall decide to leave in the building, or damages owing to the use of inferior materials.

And the said contractor covenant with the proprietor that, provided the payments are from time to time duly made in pursuance of the terms and conditions hereof, that no mechanics lien shall or will be filed or registered against the said building or the lands occupied thereby or engaged therewith by the said contractor or by any person or persons who in privity with him may be entitled or claim to be entitled to register such mechanics lien. And the contractor hereby agree to indemnify the said proprietor and his (house) building and lands against all and every such claim or lien and against all loss, costs, charges and damages which may be sustained by reason thereof.

And provided further, that on or before the said thirtieth day after the completion of the said work a final certificate shall be obtained from and signed by the architect, certifying to the balance due to the contractor on the said contract and for all extras in respect thereof. But if after demand thereof such final certificate is not obtained or the giving of the same is refused by the architect, the contractor shall nevertheless, after the expiration of the said thirty days, be entitled to proceed at law to enforce payment of the balance due to under the said contract and for all extra work in respect thereof.

Third : The contractor, at his own proper costs and charges, is to provide all manner of labor, material, apparatus, scaffolding, utensils and cartage of every description needful to the due performance of the several works, and render all due and sufficient facilities to the architect, superintendent or clerk of the works for the proper inspection of the works and materials, which are to be under their control ; and they may require the contractor to dismiss any workman or workmen who may be incompetent ; the workmen and contractors being only admitted to the grounds for the purpose of the proper execution of the works, and the contractor or his foreman for each trade shall and will, during the whole time of the building, give due personal attendance upon the execution of all the works aforesaid, and take effectual care that the same be carried on, executed and performed with such expedition and despatch to be in every case completed by the day provided for the completion thereof, subject only to such provision for an extension of time as herein provided. The contractor shall deliver up the works to the proprietor in perfect repair, clean and in good condition when completed, but will not hold himself responsible for any damage done to his work by other trades.

The contractor shall not sublet the works or assign the contract or any part thereof without consent in writing from the architect.

Fourth : In case it should appear that the contractor cannot finish his contract within the time above specified, or in case the said works are not carried on with such material and workmanship or expedition as the architect, superintendent or clerk of the works may deem proper, then, with the written consent of the proprietor, the architect shall be at liberty to give the contractor days' notice in writing to supply such additional material or force as in the opinion of the said architect is necessary ; and the contractor failing to supply the same, it shall be lawful for the said proprietor (at the expiration of days after the expiry of such former notice) to dismiss the said contractor and to employ other persons to finish the works in such a way as the architect may direct, and in accordance with plans and specifications ; and all payments made in respect thereof shall be deemed payments on account of the contract, but without prejudice to the right to recover from the contractor any money in excess of the contract price which may be paid for so finishing the works, or any other damages caused by the breach of this contract, and the residue of the money payable hereunder, if any, after deducting such payments and damages, shall belong to the contractor.

Fifth : All work and materials as delivered on the premises or adjoining thereto, for the purpose of forming part of the works, to be considered the property of the proprietor until the works shall be completed, and are not to be removed without the written consent of the architect ; but the contractor shall have the right to remove all surplus material after he has completed the works herein contracted for.

Sixth : And it is hereby further agreed by and between the said parties as follows, this is to say :

(a(That the specifications and drawings are intended to co-operate, so that the works shown in the drawings and not mentioned in the specifications, or vice versa, are to be executed as if work was both shown and specified to the true intent and meaning of the said drawings and specifications.

(b) In case of any discrepancy, all written or figured dimensions in drawings shall supercede and prevail over the measurement by scale.

(c) Should any dispute arise respecting the true construction or meaning of the drawings or specifications, or the true value of the works omitted by the contractor, or extra work or alterations ordered by the proprietor or architect, the same shall be decided by the architect, whose decision shall be final and conclusive.

(d) Should the proprietor or architect at any time during the progress of said works require any alterations of, or deviations from, additions to, or omissions in the said plans and specifications, he shall have the right and power to make such change or changes, and the same will in no wise affect to make void the contract, but the value of work omitted (if exceeding five dollars) shall be deducted from the amount of the contract by a fair and reasonable valuation, and for additional work required in or alterations, the amount to be paid thereof shall be agreed upon before commencing additions or alterations.

(e) The architect shall be at liberty, by written orders countersigned by the proprietor, to direct any of the intended work to be omitted or additional work to be done to the building. Such agreement shall state also the extension of time (if any) which is to be granted by reason thereof, provided that in estimating of the value of such additions or alterations regard shall be had to any loss, outlay or damage necessarily and reasonably sustained by the contractor in the preparations to comply with the original drawings and specifications.

Seventh : The contractor shall be responsible for and will make good any loss or damage that may happen to the said works, and for any injury to workmen or other persons, and any damage to property, public or private, caused by reason of the manner of performing these works, against all which injuries and damages the contractor shall properly guard.

Eighth : The owner, during the progress of the work, shall pay for and maintain full insurance on said work, in his own name and in the name of the contractor, against loss or damage by fire. The policies shall cover all work incorporated in the building, and all materials for the same in or about the premises, and shall be made payable to the parties hereto, as their interest may appear.

Ninth : In the event of any additions or alterations being made that will necessitate an extension of time for the completion of the work beyond the time mentioned in the contract between the proprietor and the contractors, or in the event of delay in the completion of the work by reason of extraordinary inclement weather, or by reason of general strikes of any or all of the trade

the architect may have full power to extend the time for the completion of the works to such an extent as may seem to be reasonable and just, but no contractor or contractors shall in any way hold the proprietor liable for any delay or loss occasioned by any other contractor or contractors engaged on the works.

Tenth : Should the contractor fail to furnish the work at or before the time agreed upon, he shall pay to or allow the proprietor the sum of $ dollars per week, as liquidated or ascertained damages for each and every week during which the said works shall remain incomplete, due allowance to be made for extension of time for additional work or alterations as laid down in clause number of this agreement.

Eleventh : And it is further agreed that the proprietor may employ any other contractor or workmen, who may enter upon the premises or building, to do any work not mentioned in the specifications or shown on the plans.

Twelfth : It shall be mutually understood and agreed that all sketches, plans, drawings and specifications are, and remain, the property of the architect, and shall be returned on the issue of final certificate.

In witness thereof the said parties to these presents have hereunto set their hands and seals, the day of the year first above mentioned.

Signed, sealed and delivered in the presence of :— } ....
....
....

PERSONAL.

Mr. C. de B. Leprohen, C.E., of the city surveyor's staff, Montreal, has lately returned from a trip to Europe. While in France he inspected the principal cement works, and is said to have obtained much valuable information.

Mr. J. W. H. Watts, architect, of the Public Works Department, who was for twenty-three years in the Government service, has been dismissed. Mr. Watts was not a permanent clerk, although employed in the department nearly a quarter of a century.

Mr. Henry P. Smith, late with W. Newlands, architect, Kingston, has opened an office in the Anchor Building, Brock street, Kingston, and is preparing plans for a fine new stone building for the Sisters of Notre Dame Convent, to cost about $10,000. He would be pleased to receive catalogues and samples.

Much regret has been occasioned by the recent death of Major Perley, who was formerly chief engineer of the Department of Railways and Canals at Ottawa. Major Perley was engaged by the Dominion Government to supervise the erection of the Canadian Building at Bisley, and while so employed succumbed to an attack of bronchitis.

Wm. W. H. Gairns, who had been connected with the Bennett & Wright Company, of Toronto, for twenty-three years, died at his residence on Chicora Avenue a fortnight ago. As foreman for the company he took charge and successfully completed some of the largest work in the Dominion, including the Parliament Buildings at Victoria, B.C.

Mr. Peter McMichael, who for many years has been connected with the James Robertson Company at Toronto, has been promoted to the management of the branch at St. John, N.B. Before leaving, his business confreres evidenced the esteem in which he was held by presenting him with a diamond ring, accompanied by an illuminated address. Those who assembled at the Rossin House on the occasion were: Representatives of the Booth Copper Company, Limited; the Goderich Organ Company; the Miln, Bingham Printing Company; the Montreal Roller Mills Company; the James Morrison Brass Manufacfuring Company; the John Ritchie Plumbing Company; the Toronto Foundry Company; the Toronto Radiator Company; the Toronto Hardware Company; the Toronto Steel Clad Bath Company; the Standard Manufacturing Company; the Gurney Foundry Company, and others.

The celebrated red granite of the Bay of Fundy region is capable of withstanding a pressure of 11,812 pounds to the cubic inch.

The development which has taken place in recent years in the use of metal as a covering material for the exterior or interior of buildings is well illustrated by a handsome catalogue recently published by the Metallic Roofing Co., of Toronto. In this catalogue are shown a variety of patterns of metal covering material adopted for roofs, outer and inner walls, ceilings, wainscoting, dadoes, etc. Photographic reproductions are given of a number of prominent public, business and residental buildings in various parts of Canada in which this material has been thus employed.

MANUFACTURES AND MATERIALS

MANUFACTURE OF MOSAIC FLOORS.

The Yale Scientific Monthly describes a new process of manufacturing mosaic floors. Small particles of wood, such as saw-dust, wood, flour and fine shavings, are treated first with a mixture of shellac and alcohol, and with them a cement made of curd and slaked lime, and while this mixture is still damp it is put into hot moulds of the desired shape and size and placed under pressure; the joint action of the heat and pressure unites the wood most thoroughly with both the shellac and the cement, and after a few minutes the compound is taken out of the moulds and completely cooled and hardened. Great care is necessary that no foreign substance, especially of an oily nature, be present, as this would prevent the cement from being absorbed into the pores of the wood. In making different colored mosaic the natural color of the woods used is taken into account, then the wood itself is dyed, and lastly dyes dissolved in alcohol are mixed with the shellac. The process is then performed as before. It is said that notwithstanding its hardness, this compound possesses all the perfection of wood, thus rendering it of particular adaptation for use as a floor covering in the case of living rooms and private dwellings, and the important advantage is claimed for it of being unaffected by any changes of temperature.

ASBESTIC PLASTER.

A VERY satisfactory test of asbestic plaster was recently made in the United States Treasury Department Building. In the court was placed a structure representing a miniature house, the roof of which was about four feet high, the interior being plastered with "asbestic," the name by which this new wall plaster is known. Around the structure were piled kindling wood, shavings and paper enough to make a bon-fire to celebrate a great political victory. After being ignited the light structure was immediately enveloped in flames, which burned fiercely and furiously, but to no avail, as they had found a master. After being subjected to the fire for half an hour an important test was made. A stream of water, through a one and a half inch nozzle, was poured on the plaster attached to the sides and roof without any effect. It is said that the plaster did not drop or crack, but was intact, demonstrating conclusively that it was fire-proof.

Gen. Wm. Sooy Smith, of Chicago, says of asbetic plaster: "Fire-proofing, to be worthy of the name, must resist the combined action of heat and water, and be a non-conductor of heat. In trying to find a material that would serve the required purpose I first tried talc, which is a good non-conductor and very refractory. Soapstone is an impure talc. By mixing this in a pulverized condition with hydraulic cement and other substances I succeeded in making a good fire-proofing material. While conducting these experiments I heard of a material in the great asbestos mine near Montreal, Canada. There is found in that quarry serpentine rock carrying a large percentage of asbestos. This rock, pulverized and mixed with good cementing material, makes by far the most perfect fire-proofing yet discovered. It may be heated to 1,100 degrees Fahrenheit (red heat) without harming its durability. Nails may be driven into it and it will not crack. When the nail is removed nothing but a small hole remains, which may be readily filled with putty or any other substance in order to restore the finish of the wall. Struck with a hammer, there is no breakage only the indentations showing. Then, again, the material is elastic. If the building settles or sinks, it stretches, and the plastering is not marred. Another point is that it will take decoration equal to canvas without danger of the picture being destroyed should the walls settle."

E. G. Scott, Quebec; M. J. Butler, Napanee; F. G. B. Allan, Napanee Mills; R. C. Carter, Kingston; S. Rathbun, Desoronto, and James N. Greenshields, Montreal, are applying for incorporation as the St. Lawrence Portland Cement Co., with a capital of $25,000.

THE LITTLE CHURCH OF ST. MARTIN.*

By Fred. T. Hodgson.

(Concluded.)

In the transept of the Martyrdom, a small, square stone marks the spot where Becket was murdered; but nothing now remains of the magnificent shrine that was erected to his memory. In the sixteenth century, when crafty Henry the 8th sat on the throne, he issued a proclamation abolishing all high festivals in the month of July, his plea being that holidays during that month interfered with the harvesting, but his real object was to suppress the pilgrimages that went to Canterbury, and to strike a blow at the Church. Henry's next step was to destroy all the Becket relics and to scatter all of the mortal remains left of the saint to the four winds. This was followed by confiscation of all the gold and jewels that had been offered up at the murdered bishop's shrine. It is recorded that two large coffers were filled with gold and precious stones, and that it required eight men to carry them out of the church, and that twenty-six carts were loaded with the other spoils, among which were many works of art in metal, tapestry and other valuable works. "The Regale of France," the most costly jewel in Europe at that time, was worn by the king on his thumb for a long time, and was last heard of among the precious stones of his daughter Mary, "Bloody Mary."

Following Langdon came a number of able archbishops, who added much to the cathedral. Chicheley in 1414-1443; Morton, 1449-1517, with their priors, Goldstene and Chillenden, who were architects and builders. These men finished many portions of the work that was previously incomplete, made restorations, added art treasures of many kinds and left an impress for good on many portions of the venerable structure.

It will be impossible for me in a single paper to either name the long line of archbishops who have governed here, or to mention, ever so briefly, the many points of interest, or describe the art features connected with the building. I may say, however, that although the soldiers under Cromwell made a barracks of the building for a time, and actually stabled their horses in it, it contained some things that commanded their respect and veneration. The tomb of the Black Prince, in which sleeps all that is mortal of the brightest flower of English chivalry, was left untouched, but many of the most beautiful painted windows on the Island were smashed by the Puritans, and as their captian "Blue Dick" remarked, they had a good time "smashing Beckett's glassy bones." Several of the old windows were left, however, among them one containing a picture of King Edward the 5th and his brother the Duke of York. These windows are the admiration of the whole world, for their beauty of color, accuracy of outline and prefection of workmanship. They were made and put together in the city of Canterbury, and remain an evidence of the high artistic abilities of the native painters and glass workers.

So far this paper has dealt with matters historical, and I may be pardoned if I now somewhat digress and say a few words on the æsthetic character of Christ Church and the influence this quality had on English art.

As we have no knowledge of the style or the fitness of the first building erected by the Romans where the cathedral now stands, only what we can gather from the few remaining portions left in the foundation walls, and but little knowledge of the more recent buildings down to the time of the Norman invasian, I am not in a position to give any opinion as to the influence those early structures may have obtained over contemporary art and artists.

Whatever may have been the faults of the fire-eating Normans, they had the quality of being devoted to their Mother Church, and every possible sacrifice was made to advance her interests and strengthen her position, and it is not surprising to find William, who was one of the most superstitious men of that superstitious age, putting forth his efforts to benefit the Church for the assistance he imagined he had received from her in placing him on the throne of England.

Canterbury, the second city in the realm, the seat of the primate, as acknowledged by Rome, received his attention at once, and his ablest churchman, Lanfranc, was made archbishop and primate, and money was appropriated for the re-building and enlargement of the cathedral, and a large Norman building rose upon the ashes of the old Saxon one, that became the example for hundreds of other churches and domestic buildings. It would perhaps be out of place to describe the peculiarities that belong exclusively to the Norman style of architecture. Its main features, however, put tersely, were semi-circular arches, massiveness, large openings for doorways, windows and entrances. Another peculiarity is the richness of the entrance arches, while their columns, walls and jambs were usually plain. The interior of their churches, while not so massive as the Anglo-Saxon, gave the appearance of great strength, and the ceilings being low, had the effect of giving a fort-like aspect to the buildings. Indeed, their castles and their churches were somewhat similar in appearance. In details, however, the Normans excelled the Saxons very much, and gave to their work a finer and a more artistic finish, and the best artists in England during the reigns of the 1st and 2nd Williams, Henry, Stephen, Henry 2nd, and Richard 1st were trained in Canterbury. With the partial destruction of the church by fire in 1174, a new departure in the style of the building took place, and Gothic, as we now know it, was introduced, and the cathedral became a new example. At this time the cathedrals of Rochester, Winchester, Norwich, Peterborough, Durham and several others, along with York Minster, West Minster, St. Pauls, and dozens of abbeys and monastries, were either nearly completed or well on their way. When the new and more appropriate style of architecture was introduced, work on those buildings was suspended, changes were made, and the new style was adopted, as if by order of the king or primate. It was this sudden change of style that has given to a number of English cathedrals and dozens of parish churches that peculiar quaintness and delightful piquancy that makes them so dear to the hearts of all who love the beautiful in architectural art.

The difficulties of solving these problems were wrestled with, to make those changes in the half completed buildings, to dovetail the new into the old style, and evolve from their admixture the gems those old builders have left us, can only be understood by those who have wrestled on a smaller scale with problems somewhat similar. During the Canterbury pilgrimages, the cathedral became rich in money, in patronage and in the

*A paper read before the Collingwood Fortnightly Club.

‡ The paper was illustrated by lime-light views of the Church of St. Martin, and of the great cathedral.

most costly artistic productions of all lands. In fact, the church became a veritable museum of art. No young man was supposed to have finished his education until he could say he had "sojourned" in the "Holy City of Canterbury," for a twelvemonths at least.

As stated before, the best glass painters in Europe acquired their art in that city, and the fragments of windows still left in the church that were the work of the 12th, 13th and 14th centuries have no equals in Chrisendom, and to this day artists from France, Spain, Germany and Italy visit Canterbury for the sole purpose of seeing and examining these painted windows. Religious art died in Canterbury when the Reformation made its advent. From the day of the separation of England from the Roman church, the doom of religious art was sealed for a time. Like a second black plague, Henry's infamous emissaries swept over England, leaving desolation behind them. The people rose in valiant defence of their supposed guides and protectors, the monks and friars, but their struggles were in vain. Abbeys and monasteries, cathedrals and churches, shrines and tombs, fell a prey to the kings mercenaries. Desecration took the place of consecration. Churches were no longer built but destroyed; religious art, which is the foundation of all art, was scoffed at, and things of beauty, if connected with the Church, were jeered at, and when possible destroyed. Abbeys and convents and monasteries, once centres of religious education, charity and benevolence, were blasted by fire or turned over to conscienceless followers, and the country was studded with ruins—ecclesiastical art, in all of its branches, came to an end. It had died a violent death, not a death from decay or exhaustion; and the great church of Canterbury, being the centre of Ecclesiasticism, suffered most; and its interior was robbed of almost everything the great Harry could turn into money.

What the people lost, however, in ecclesiastical art by the Reformation, they gained in freedom of thought, material wealth and domestic art. Men and artists who had been employed their whole lives in the building and decoration of great religious temples, were employed by the enriched adherents of the king in building, enlarging and beautifying the domestic castles and halls that have made England a land of "stately homes," and gave to Eliza Cook an opportunity to exhibit her beautiful poem, "Those Stately Homes of England." It was during the latter part of King Henry's reign and the early part of Mary's that Hatfield House, the present home of the Salisbury's, "Speke Hall," and many other noted domestic buildings on the Island, had their beginnings.

What Henry left undone in the way of destroying art work in the churches, the Puritans finished. They went much further than Henry, and with less reason. It is to them that is due the destruction of the most beautiful glass-work the world ever produced. Canterbury, York, Durham, Chester and Westminster suffered severely from the vandalism of Cromwell's fanatics. Nearly all images and statuary of a religious kind had been removed and mostly destroyed by Henry's order, but the Puritans defaced the buildings proper, breaking the figures in the walls, on the capitals and in the exterior niches, and mutilating the tombs, destroying memorial brasses and tearing down reredos and screens because they had in their combination symbols of the Christian faith. Notwithstanding all its misfortunes and disasters, the noble structure still exerts an influence on religious architecture in England, and with the revival of religious activity in the latter part of the last century, the Renaissance methods fed largely on the various styles, as embodied in Canterbury, when applied to the new temples demanded by the new-born fever. The building as left us by William of Sens, the Saxon William, Chicheley and the two Goldstenes is yet a power for good in the world of religious architecture. In closing, I may say that a number of kings and queens, some 25 archbishops, several noted warriors and statesmen, are buried inside of the church. The last archbishop interred under the roof was the Cardinal Archbishop Pole, who died 1558. During the reign of Queen Elizabeth, the crypt under the cathedral was allowed to be used by the Hugonots, who brought with them from France many of the useful arts, and the spinning and weaving of silk, an industry unknown at the time in England. For a time Canterbury became the centre of the silk trade, but eventually branches of it were taken to other cities—the ribbon trade to Coventry, velvets, plushes, etc., to other places. And now Canterbury, once the most important city in England, is not even a third-rate place, if population and wealth are considered, but as a place full of glorious memories—a shrine, where religious or patriotic devotees may visit with gratification and profit—no other town or city in the "tight little isle" offers the same opportunities. The influence radiating from the little Church of St. Martin, having their beginnings with the baptism of Ethelbert, are still active, not only in the narrow limits that form Great Britain and Ireland, but over an area greater than Ethelbert supposed the world to be, and the two hundred millions of people speaking the language whose rootlets were planted by this early king, and enriched by the auther of "The Canterbury Tales," and rounded up by the immortal bard of Avon, still feel that influence; and by their unsurpassed energy, their incomparable governmental methods, and love of justice, will continue to spread, by good example, and by giving equal rights to all mankind, the benefits inherited by the conversion of the brave Ethelbert, and his baptism in the little Church of St. Martin. And in conclusion let me add that all this was brought about by the love and wisdom of the gentle Bertha.

What an heritage then is this little church, coming down to us from the time when Rome was mistriss of the world, and in which Roman soldiers had worshipped. It survived its builders, and saw the Roman legions leave the land forever; it witnessed its own desecration by Saxon and by Dane, and its final triumph over the Scandinavian gods, and its settlement down to peace and glory and reverence under the Normans, to again be governed by the race, whom by the help of Bertha, made it the first Saxon christian church on the British Island.

PUBLICATIONS.

The American Monthly Review of Reviews for August devotes itself with accustomed thoroughness to the new tariff.

We are indebted to Mr. Chas. Baillairge, C. E., for a copy of the transactions of the Geographical Society of Quebec. It contains a frontispiece, a portrait of the Hon. N. S. Parent, Minister of Agriculture of the Province of Quebec, and patron of the society, also a portrait of Mr. Frank D. Tenis, president of the society, and of several ex-presidents and explorers, together with exploration maps and photographic reproductions of scenery in the extreme north.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Nails Required. IN estimating the cost of work it is necessary that an approximate amount of nails required to complete the work should be known. Since the introduction of the wire nail, the number of nails required to do a given piece of work is not the same as when the barbarous "cut nail" was in vogue; therefore, the rules given for the latter will not apply to the former. The table given herewith is nearly correct, and is based on experience:

For 1000 lath, it takes 5¾ lbs wire lath nails.
For 1000 shingles, 5" to weather, 5 lbs shingle nails.
For 1000 feet 6" sidings, 18 lbs 2½" wire nails.
For 1000 feet common boarding, 20 lbs 2¾" wire nails.
For 1000 feet rough boarding, 22 lbs 3" wire nails.
For 1000 feet square edge 1" flooring, 36 lbs 3" wire nails.
For 1000 feet square edged 2" flooring, 40 lbs 4" wire nails.
For 1000 feet matched flooring, blind nailed, 31 lbs 3" wire nails.
For 1000 feet burring, 1"x3", 42 lbs 3" wire nails.
For 1000 feet burring, 1"x2", 60 lbs 3" wire nails.
For 1000 feet pine finish, 26 lbs 2½" wire nails.
For 1000 feet hardwood finish, 20 lbs 2¼" wire nails.
For 1000 feet studding in walls, 10 lb 3" wire nails.
For 1000 feet rafters, cellar beams, 8 lbs 3" wire nails.
For 1000 feet common fencing, 12 lbs 3" wire nails.
For 1000 feet pantry fittings, shelves, hook strips, and similar work, about 5 lbs 2" wire nails.

These figures are very nearly correct, sufficiently so to answer the purpose of the estimator. Of course, if the sizes of the nails are changed—larger or smaller—the figures must be changed to suit.

House Designing. ONE of the faults of the country builder when he designs a frame house or village cottage, is that he makes but little provision for closet room, and none whatever for the proper distribution of furniture. Every bed-room should have a closet attached in some convenient place, where the door will not interfere with a proper arrangement of beds and other furniture. Wall space between windows and doors should be left for all the furniture, and, when possible, the bed should stand nearly in the middle of the room, with the head against the outer wall, and ample space should be left in other parts of the room for a dressing stand, a toilet stand, a table and a few chairs. By proper management, this may easily be accomplished in a medium sized room having two windows, a closet and an entrance door. The problem is not a difficult one if a little thought and judgment is used while planning. Sometimes, however, conditions are such that the designer has but little option in the matter, but it is possible that with the available opportunity at his command, he can do much towards getting such wall space, by placing the doors and windows in the best possible places, as may give to the room a comfortable and tasteful appearance. It is astonishing how much more convenient a room may be made by a display of judgment than if laid out without thought.

Strength of Built Up Timbers. IT has been stated that a built up beam is stronger than a solid beam of the same dimensions. This assertion will strike the novice as exceedingly absurd, yet most carpenters and millwrights have been taught to believe it, and the reasons for its being so have been advanced so often that they are almost threadbare. Most timbers, it is said, have knots in them, or are sawed at an angle to the grain, so that they will split diagonally under a comparatively light load. In a built up timber no large knots can weaken the beam except so much of it as is composed of one joist, and joists whose grain runs diagonally to the outside cut will be braced and strengthened by the other pieces being spiked to it and having the grain running in a different direction. To some extent this reasoning is true, but the quality and strength of timber being variable, the rule does not hold good in all cases. In fact, by experiments made by Hatfield in New York, and Kidder in the Tecnological Institute, Boston, results showed that, all things being equal, a built up beam with butt joints is not as strong as a solid one of the same dimensions by from 20 to 30 per cent. Beams built up, and having no butt joints, quality of material being the same, are from five to eight per cent. weaker than solid ones of like dimensions. In most cases where the work is being done outside the larger cities, the timbers specified are generally sufficiently large to cover any defects or weakness in them, so that there is little danger of serious results following the use of the timber specified, even if they are "built-up."

Laying Floors. IN this country, particularly that portion laying north of Lake Huron, Manitoba and the Northwest Territories, great care should be taken in putting down floors in order to make them warm. Floors should be double, with a layer of thick paper between them; and this should be done on all floors, no matter how many stories there may be. The floor should be laid tight—it would be better if it was matched—but it need not be of good quality; if it is sound it is not essential that it be free from knots. The paper and upper floor should not be laid down until the plasterers and plumbers have done their work, and all the base and wainscot should be put down before the top floor is laid. It is usual to put down the paper and then lay the floor close over it,

This is not the best way to do the work if it is desirous to accomplish the best results, as experience has proven. The better way is to lay down the paper, then over the paper, on a line with the joists, put down strips of wood 2" x ⅜", and then put the top floor down, nailing over the strips so that the nails will be sure to find the joists. The advantage of this method over the other is that a cushion of air lies between the two floors, which acts as a non-conductor of cold and sound, a very important matter in a building. The positions of the joists may be marked on the base-boards before the paper goes down, so that the strips may be placed in their proper places with the least amount of trouble. The writer has found that the best results are obtained by making use of felt paper, the softer and more spongy the better. Tarred paper is objectionable, for several reasons: it is not a strong paper, and it is impossible to get rid of the smell which is sure to work its way into the room when the latter is heated, and causing disagreeable sensations. Four or five layers of newspapers do very well, but where good, suitable paper can be obtained newspapers should not be employed.

Boulder Foundations.

In many rural districts the obtaining of quarried stone is difficult and expensive, and hard burned bricks suitable for the purpose of laying foundations, as a rule, cannot be secured. The use of boulders or field stone for the purpose may be adopted with success if the mason doing the work knows his business. In some sections of Ontario the use of boulders is quite common in the construction of foundations, outbuildings, fences and similar work. In the town and district of Parry Sound the use of boulders, whole and broken, is quite common, and some of the work done is quite creditable, particularly in walls above ground, where the stones have been selected with regard to size and color, with a fine taste for harmony and fitness. The "pointing" of the mortar joints, too, in many cases, evinces much skill and judgment on the part of the workman. In order to make a good solid foundation much will depend on the stone. In some places the surface or field stones are tolerably regular in shape, and make a good wall without breaking or dressing, while elsewhere they are more rounded boulders. With rounded boulders alone, the main strength of the wall depends much on the mortar used, which, in such cases, should be the very best and carefully applied. The wall should be built to two faces to look well, whatever may be the allowable projection of the outside stones beyond the mortar joints. Usually the outside joints are scraped out at the pointing to give the proper effect of projection. The best appearance is obtained by mixing large and small stones indiscriminately together, but if there is much difference in size the inequality of settlement will cause cracks, and it is safer to have the stones in the courses of approximately the same height. Especially should the use of large stones for the corners be avoided. The corner-stones should be long, to tie the angle, but not thick, or there will be cracks near them if the super-imposed building is a heavy one. If there are openings of any size in the wall, these should be faced with stones having a flat surface, and if these are not obtainable, use the best common bricks at hand, seeing they are well bonded in the wall. In England, Switzerland and Germany, where much boulder work is done, bricks are sometimes used here and there in the wall as headers and stretchers, in horizontal courses, with good effect. If the mortar is good, no joints other than those at the corners and openings need to be dressed, even with the rounded stones. Walls built of field stone should never be less than two feet thick for low walls, and thirty inches or three feet for walls from twelve to twenty-four feet high. Almost any size of stones may be used, only such as go nearly but not quite through the wall, but these may be laid as stretchers if their width will permit. A boulder wall should stand three or four weeks before the superstructure is built on it. This gives a chance for the mortar to set.

Built-up Timbers.

It often happens that the carpenter can not get timbers of sufficient length to make bearing beams, bressummers, or such other timbers as the work in hand demands; under such circumstances the method of "building up timbers" or splicing short beams must be resorted to. The method of building up timbers is known to nearly every carpenter in the land, but will not lose any of its merits by being described here. Let us suppose we want a beam 12" x 12", 48 feet long, and we have no means of getting it, but have on hand a lot of joists 2" x 12", and of various lengths—say 12 feet and 16 feet long. Lay down on a good, level basis three 16 ft. joists, 2" x 12", "end on," with good joints at the butts and one edge to "a line." Three sixteens make 48, so that the three joists placed end to end will make 48 feet. On these place four joists 12 feet long, keeping the edges fair with the under tier. See that your butt joints are snug and close, then nail well with 3½" wire nails, taking care to double-nail at every joint. This being done, cut a 16-foot joist in two, and lay one of the halves—8 feet long—on one end, keeping the upper edge even with the courses already down; then lay down two joists 16 feet long, and finish with the other half joist. Nail same as before, only with longer nails. Now we have a beam 6" x 12" which is nearly as strong as a solid beam of the same dimensions. Continue to lay on joists and nail, until the required size is obtained, making sure that no two joints are over each other. It is always better, in making built up timbers, to run the joists through the planer; but in many places in the country this cannot be done, so then the workman should pick out his stuff so as to have joists of the same thickness in each tier; if not, the inequalities will prevent the joists from lying close together, which will be bad work.

Chimneys and Flues.

In building chimneys there should be no stringings exhibited, the flues should not be stinted as regards area, and there should be ample of them. In no case should two pipes go into the same flue, and no two flues should open into one another. There should at least be the thickness of a brick on edge between every flue. All flues, no matter whether they are intended for smoke flues or for ventilation flues, should be parged with good mortar their entire length, the parging to be made smooth. If a few dollars' expense is not minded, it is a good plan to have an 8 inch drain tile placed in the flue, from top to bottom. This may be easily done if the tiles are put in in lengths as the flue is being built. The joints may be made tight by filling them up with mortar as the tiles are put together. A flue made this way is sure to give good satisfaction; it will rarely get

dirty with soot, and when it does get dirty it is very easily cleaned. Have a spare flue in each chimney which may be used for ventilating if so desired. Arrange for a soot drawer in every flue; this may be done by leaving out one stretcher brick four or five courses below the stove pipe hole. If it is intended at any time to pipe the house for water, gas, or heating, the breast of the chimney may be extended in breadth, and a "pocket" eight or ten inches wide by the size of the projection of brickwork in the room may be left the whole height of the room. This pocket may be formed by either running a four inch brick wall, flush from the face of chimney breast, with hollow space behind or it may be formed with studding, lathed and plastered on the front, and left open on the side so that a moulded board can be screwed over the opening in order that the piping can be put, and to get at the pipes for repairs or otherwise, after they are in place. Chimneys should be built high enough above all ridges or chestings to prevent the eddies of wind caused by these ridges and crestings to make a down draft. It is a question not yet settled as to how high a chimney top should be above the ridges so as the avoid these eddies. The writer has learned from experience that it is not always safe to have the top less than twelve inches above the highest point of the building. Do not narrow or contract the flue at the top. This practice, which is too common, often leads to serious trouble, as many a chimney smokes because of the flue being contracted at its delivery.

THE LATE THOMAS WAND.

In the death of the late Thomas Wand the city of Montreal has lost one of its best known contractors and a leading citizen. The whole life of the deceased was spent in Montreal, where he was born 78 years

The Late Thomas Wand.

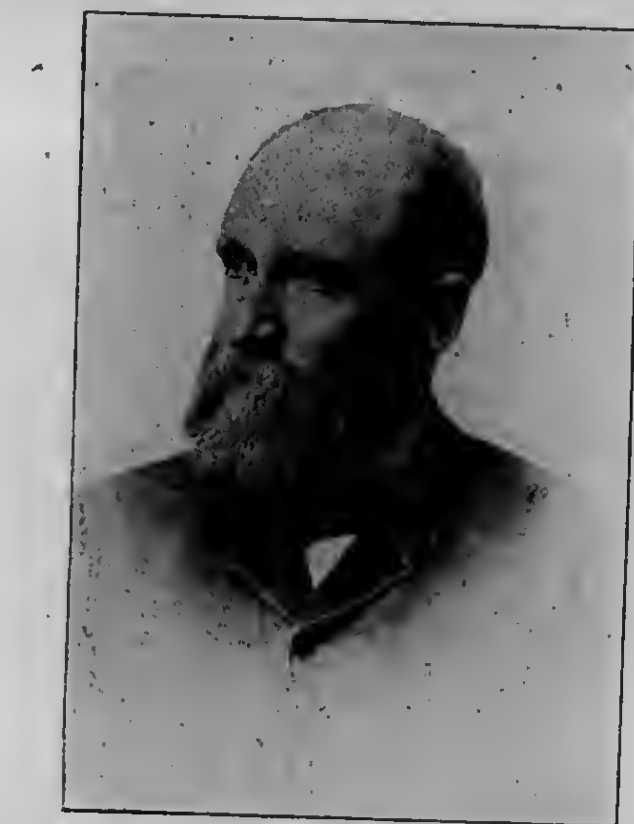
ago. He commenced life in a very humble capacity, but eventually achieved a leading position in the business community. In partnership with Mr. Moir Wand the deceased was engaged in many public works, and under the firm name of Phillips & Wand erected many of the public and private buildings in the city. Mr. Wand, however, retired a few years ago from active operations. His death was due to a heavy cold contracted two months ago, from which he never entirely recovered.

During the past fifty years Mr. Wand was connected with many important works of construction, including Trinity church, Mechanics' Bank, church of St. James the Apostle, and the Windsor hotel. His last contract was the Bell Telephone Company's building at Westmount, during the execution of which his health failed him.

Deceased was a member of the Episcopal church and of the Mechanics' Institute, and took an active interest in the welfare of the community in which he lived.

MR. GEORGE H. PROCTOR.

The subject of the accompanying portrait, a well-known builder and contractor at Sarnia, Ont., was borne in the township of Moore, Lambton County,



Mr. George H. Proctor.

November, 1842, and has since constantly resided in the locality.

After leaving school Mr. Proctor chose the carpenter's trade, at which he served the usual apprenticeship term. At its termination he entered into business as a contractor on his own account, in the townships of Moore, Sarnia and Sombra, and in 1876 removed to Sarnia.

Among the more important buildings erected by Mr. Proctor may be mentioned the Collegiate Institute, general hospital, G. T. R. railway station, the summer hotel at Stag's Island, River St. Clair, C. M. Garvey's residence and several large stores.

Mr. Proctor has been a member of the public school board and town council of Sarnia for many years. In the latter body he was elected deputy reeve and reeve, and to his efforts was largely due the erection in Sarnia of the Lambton County house of industry.

Mr. Proctor has also taken considerable interest in friendly societies, such as the Oddfellows, A. O. U. W. and I. O. O. F.

Mr. J. Mason, builder, Brampton, is completing the remodelling of a fine brick residence for Mr. H. Dale.

Messrs. Carter & Co., Elora lime kiln proprietors, state their business is showing a very satisfactory increase. The firm now control the output of four kilns.

If you have to paint ironwork that is to be subjected to heat, do not attempt to mix it yourself. You will require a specially made paint. Such are on the market and are made in all colors for funnels of steamboats, etc., and in white for reflectors over gas jets.

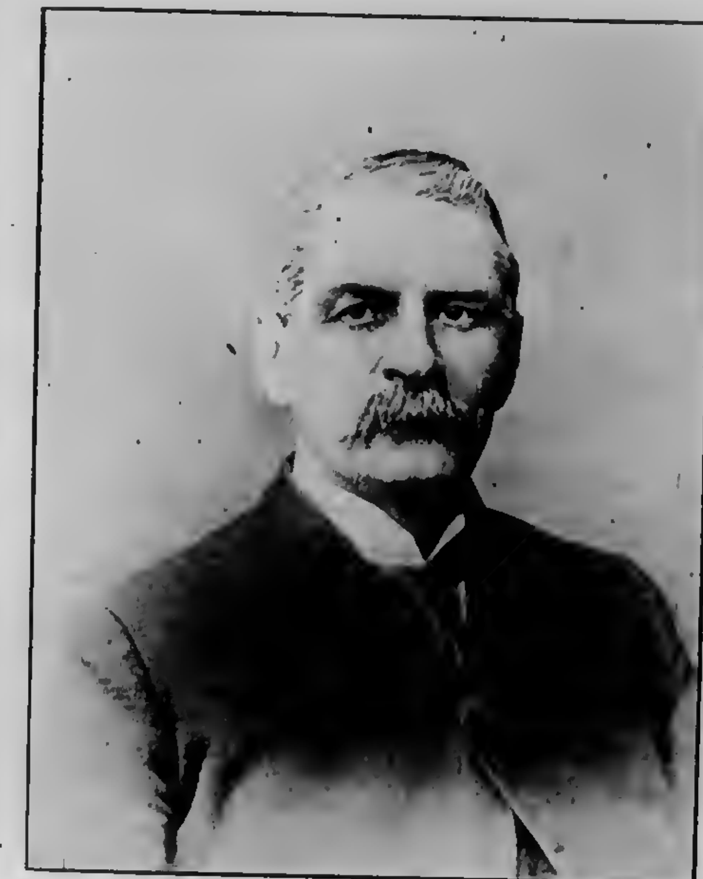
PROMINENT CANADIAN CONTRACTORS.

VI.

MR. J. E. ASKWITH.

The name of Mr. J. E. Askwith, of Ottawa, is familiarly known throughout Ontario and the eastern provinces, he being a contractor of wide and varied experience. He was born in the city of Ottawa on January 28th, 1841, was educated in the common schools, and served his apprenticeship in the carpenter and millwright trades. In the year 1872 he engaged in the sawn lumber business, and commenced contracting three years later.

The mention of some of the most important contracts executed by Mr. Askwith will serve as an indication of his success. In the vicinity of Ottawa he built the Geological museum, the Government printing bureau, including placing of shafting and machinery, a number of residences, the Wellington bridge on the Rideau river, and piling the west bank of the Rideau canal. The outside work included the Quarantine Hospital at Grosse Isle, Que, Marpeth pier, Lake Erie, Stratford post office, Niagara Falls post office, Peterborough post office and custom house, Chatham post office, Cape Bauld light house, Newfoundland, Nottawasaga light house and the Colchester reef light house.



MR. J. E. ASKWITH.

The latter work was a dangerous and difficult piece of construction, and American engineers declared that it was impossible to build it. The light house was situated seven miles from land in fourteen feet of water, with the full sweep of the lake.

Mr. Askwith was also a member of a firm that constructed a section of the C. P. R. short line through the state of Maine. He is now engaged in building one of the largest armories in the Dominion, at Halifax, N. S., the cost of which will be $200,000.

For seventeen years Mr. Askwith was councillor and school trustee in New Edinburgh before that village was annexed to Ottawa. After its annexation he was elected alderman for the city of Ottawa for four successive years, and was chairman of the Board of Health for three years. He is now a member of the Park Commissioners of Ottawa.

CONSTRUCTION OF BRICKS.

In a paper on "Brickwork," read before the Architectural Association of London, Eng., Mr. John Toomey gave the following suggestions regarding methods of using different materials:

SAND. I have often found that the quality of the sand used for building purposes does not receive the attention it deserves. A clean, sharp sand is essential to the making of good mortar, whether mixed with lime or cement. The many impurities to be found in sand must act injuriously and tend to detract from the strength of the mortar. The best way to avoid this is to wash the sand, but the expense attached to this process prevents its general adoption. But I have used a "Medway" sand and one from the neighborhood of Hatfield, good in quality, being both sharp and clean. Where a mortar-mill is used the "clinkers" from a dust-destructor mixed in reasonable quantities with sand and lime or cement make a good mortar. But it is always an important point to see that a proper proportion of lime or cement is used, which is not always done.

BRICKS. The question of the qualities of bricks is such a large one that I shall only be able to speak of a few kinds. The numerous kinds of bricks that are now in the market show that greater attention is being paid to their production, chiefly in facing bricks (external). They may be divided into two classes, viz., the "sand" brick and the "pressed" brick. The different processes of manufacture of the two bricks being so different, the sand brick being moulded, whilst the materials are of a dough-like consistency, and the other being "pressed," while the ingredients are nearly dry, must tend to make the pressed brick squarer and more regular in shape and size. But a brick, like terra-cotta, must be well burnt to be durable, and in burning it loses in shapeliness what it gains in durability.

METHODS OF BEDDING BRICKS.—I think it is essential (except during the winter months) that bricks should be well wetted before being laid. This is all the more necessary where cement mortar is used. The only possible way to secure strong work is to "grout" each course of brickwork, and this is where the advantage of "washed" or well screened sharp sand is seen, as it will more readily fill the open joints of the brickwork. The plastering of mortar on the top of each course will not do. But the fact that wet bricks make bricklayers' fingers sore may have something to do with the neglect of wetting bricks. In work that is to be pointed after the building is erected, the joints should be raked out half an inch deep, and well brushed off with a hard broom to clear away all loose mortar, and the pointing should be well pressed or "ironed" in the joints. In glazed or enamelled work it may be often noticed that after a time the "glaze" flakes off and the defective part appears black. This is very often due to using chipped or defective bricks, but it is also due sometimes to another cause, viz. the mode of bedding them. The bricks having two deep "frogs," and generally being laid in a close joint, care is not always taken that sufficient mortar is spread to insure the frogs of the brick being solidly filled so that when the weight comes on the wall the pressure is largely on the outer edge of the brick, and causes the "glaze" to fly.

One way to obviate this is to fill the "frogs" before laying the bricks. Another way is to "joggle" either the end or side of the brick before bedding, and fill or "grout" them up with liquid mortar.

The conditions of present-day building often compel builders and others to carry on their works in sections. Very often walls are built with a vertical "toothing." If this cannot be avoided, I think the connection or making good to such toothing should be done with cement.

NATIONAL ASSOCIATION OF MASTER PLUMBERS.

We hoped to present in this number portraits of the vice-presidents elected at the recent convention of the Dominion Master Plumbers' Association to represent the different provinces, but up to the time of going to press those of Messrs. Doody and Borton, as representing New Brunswick and Nova Scotia respectively, had not come to hand. Portraits of the vice-presidents of Ontario, Quebec and Manitoba appear below.

Mr. T. A. Irvine, vice-president for Manitoba, is the senior member of the well-known plumbing firm of T. A. Irvine & Co., of Winnipeg, and an ardent association worker.

In Mr. John McKinley, Ontario vice-president, the association have a valued officer of much ability and keen forethought. He was born in Montreal forty-two years ago, served his apprenticeship with Garth & Co., of that city, and is now a member of the firm of McKinley & Northwood, of Ottawa. His firm have several large heating and plumbing contracts on hand at present, including the Victoria Hotel at Aylmer, new wing to the Protestant Hospital, and St. Mary's school in Hull. Mr. McKinley has been for the last two years president of the local association at Ottawa.

MR. T. A. IRVINE—Manitoba.

MR. JOHN MCKINLEY—Ontario.

MR. P. J. CARROLL—Quebec.

VICE-PRESIDENTS OF THE NATIONAL ASSOCIATION OF MASTER PLUMBERS.

Mr. P. J. Carroll, vice-president for Quebec, is a popular member of the trade. He was born in Ireland 37 years ago, coming to Canada at the age of four years and serving his apprenticeship with John Burns & Company. Twelve years ago he and his brother established the firm of Carroll Bros., and since the decease of his brother ten years ago, Mr. P. J. Carroll has continued the business under the old name.

Mr. Ralph Hodgins, of Shawville, Que., has recently added a tile machine to his brick manufacturing plant. The machine is steam power and capable of turning out 600 tiles per hour.

The Canadian Locomotive & Engine Company, of Kingston, Ont., will probably engage in the manufacture of steel pipe, under patents granted to F. A. Williams, of Wolverhampton, England.

One of the most successful of the many "new process" white leads is that in which the basic carbonate of lead is made direct from litharge. The process takes about as many days to complete as the Dutch process takes months.

ARRANGEMENT OF MAINS IN HOT WATER HEATING APPARATUS.*

By W. M. MACKAY.

CONSIDERABLE interest is manifested in the proper placing of the hot water pipe heating system, judging from the many and varied questions on this subject which have been handed in to the society by the members from year to year for discussion, and as the success of a hot water heating apparatus is largely dependent on and affected by the arrangement, size, and grade of the flow and return mains and their connections, I will endeavor to present such information as to results as I have gathered on this subject, being my own experience in planning and placing this system in different classes of buildings, my observations of the results obtained by others, and such descriptions of earlier systems as I have been able to obtain. While much has been done and said to popularize and increase the use of this system during the past twenty years in this country, Canada, and Europe, the origin of this system seems shrouded in doubt and dates back further than the earliest writers on this subject have been able to determine. Many of the so-called improved applications of the system which have been presented during the past few years as new discoveries in the art have been found to be but a revival of older ideas and an accurate description of apparatus which actually existed, in some cases, years before the modern inventors and patentees were born, and being what some of our present writers would term obsolete or antiquated.

The arrangement of mains which is most largely used in an ordinary installation of hot water heating apparatus at the present time is a number of flow mains rising from the source of supply to the farthest point to be reached, with a corresponding number of returns of the same size on the same grade falling back to the heater. Some engineers contend that this is wrong and that the radiation would be better and more uniformly supplied with a single flow and return main in the same way, but this statement should always be qualified and the existing conditions considered before it is made, for even a novice will admit that if the heater is placed at a central point to supply radiation in four different directions and this system of mains be em-

*Abstract of paper read before the American Society of Heating and Ventilating Engineers, Jan., 1897.

ployed it would be better supplied by four separate flow and return mains from the heater than by a single main, and while it is true that when the radiation is located in one direction from the heater it is often possible and practical to supply it with a single main, there is a limit in size or diameter beyond which it is not safe or wise to go, and after reaching this limit it is an advantage to use two or more mains rather than to increase the size of a single main. While larger mains have been used and recommended, I have always found it best to place the limit at from eight to ten inches in diameter, depending on conditions, my objection to a larger main being the large body of water it contains, the difference in temperature between the top and bottom of the main causing unequal expansion, and the possibility of an internal circulation interfering with the general or desired circulation.

I have in mind a large building that was heated by hot water some years ago; in one section of it, about 60 by 40 feet, the main was carried from the heaters to the outside wall and continuously around it back to within 20 feet of the heaters, making this single main about 180 feet long. The circulation in this main has never been uniform, and with a low temperature of water the far end of it for about 80 or 90 feet is almost cold, whereas if two mains of a smaller size had been used each of them would have been 90 feet long and they would have given an apparently uniform circulation. While it is claimed that it is impossible to hold cold water above hot water in a hot water system, it is impossible in this case and in any case where, on account of large main, and a free circulation through the radiators and risers near the heater, the water is allowed to enter the return main near the heater at, say, five to ten degrees lower than the temperature of the flow main; the natrual tendency of this heated water in the return main is to travel towards the upper end of the main instead of returning to the heater, and under these conditions, as soon as a sufficient number of radiators and connections are circulated to relieve the heater at the temperature at which it may be operated, the two columns of water at about the same temperature travelling or attempting to travel in the same direction hold the balance of the system in check and keep it cold. As it is often necessary to arrange mains in this way and sometimes impossible to arrange them in any other way, it is very desirable that there should be a remedy for this trouble, and I have found that the best and surest preventive was to take the connections for the near radiators, or for all the radiators and connections, from the side instead of from the top of the flow and return mains, thus retarding the flow through the near connections, assisting the flow to the extreme end, and making a uniform circulation through the entire main and system.

I designed an apparatus in this way some time ago where the main was over 300 feet long, and with the water at the heater at 130 degrees F., the temperature of the water at the extreme end was 120 degrees, while with a higher temperature of water at the heater the difference was less, until at 180 degrees the difference was only five degrees. I mention this to show that with a prpoer arrangement of branch connections and a suitable size of main it is possible to circulate water through a continuously rising horizontal main for long distances at a comparatively uniform temperature.

Where this system of mains is used and it is found desirable or necessary to supply indirect radiation or to locate radiation in the basement I have found it to be an advantage to use a separate main, either arranged with a siphon extending to the ceiling of the first floor or by increasing it in area, doing away with the siphon and dropping from a high point above the heater to the radiation and returning at or below the floor line, in either case carrying an air pipe from the highest point to the expansion pipe or expansion tank.

The overhead system, where practical or permissible, has some advantages, doing away with separate return risers and permitting the use of a smaller area of main for a given amount of radiation, and while the temperature of the water on the lower floors with this system is lower than on those above, radiation can be figured uniformly on any floor with a certainty of a uniform temperature and a positive knowledge as to results.

TO MAKE STRONG TRACING PAPER.—Dampen a piece of ordinary thick paper with perfectly distilled benzine, and trace on your design with pencil or ink. When the benzine evaporates, the paper will resume its whiteness and opacity. If the evaporation takes place before the design is finished, dampen anew.

There is a plumber in a certain city who is at present suffering from a severe stroke of paralysis, for which, it seems, a lady resident is responsible. One day recently, the drains of the house becoming clogged, she sent for him. He went up, and after removing four rats, the hired girl's autograph album, part of a loaf of bread, the baby's rattle and Jimmie's fur cap, he cleaned the pipe and got the drainage system in working order.

Please mention this journal when corresponding with advertisers.

NEW ARCH CENTRES.

In the construction of masonry arches and vaults, it is not always possible to erect ordinary centres, as when the arch is near the surface of water. A writer in the Annales des Ponts et Chaussies illustrates two kinds of false-work, which have special features, and have been used at Bordeaux. The contractors supported the masonry upon a cylindrical platform or lagging of iron plates about 3¼ in. thick, suspended from three pairs of lattice arched girders above, and clear of the arch of masonry. At equal distances on panel points, 2 in. suspended rods ran down through the vault lagging and cross beams, supported from screw nuts on plates across the tops of girders. These rods passed through holes cut in the arch stones, normal to the intrados. The centres were easily removed by unscrewing the nuts from the lower end of the suspending rods. The Engineering Record, which describes this system of centering, illustrates the plan by elevations and cross-sections of the plan. Another method is also illustrated, in which the intrados of the arch of masonry are carried by iron lattice-girders below the soffit in the usual position of centres. Six girders were framed together, though each acted as a simple truss instead of an arch. The two trusses at each end were connected and incased by iron plates, and formed two four-sided or rectangular water-tight caissons of cylindrical curve to suit the arch. These floated the whole false-work into position at high water. They, in fact, formed two caissons of the depth of the arch, and of its whole width, segmental in form, corresponding to the arch, connected together, and having between them the other trusses. The straight iron girders were inserted in the masonry piers, and the trusses were landed upon them and made stable by admitting water through valves. The vault was then built, and the centres were afterwards struck by slacking the screws in the usual way. The first-described method is really an overhead centre, by means of which the real masonry arch is suspended, while the second plan is really a floating centre below the arch to be constructed, the ends being floated into position, and the centering and lagging constructed between them. Both plans are ingenious methods of forming centres for bridge vaults which are too close to the water surface to admit of the usual plan being used.

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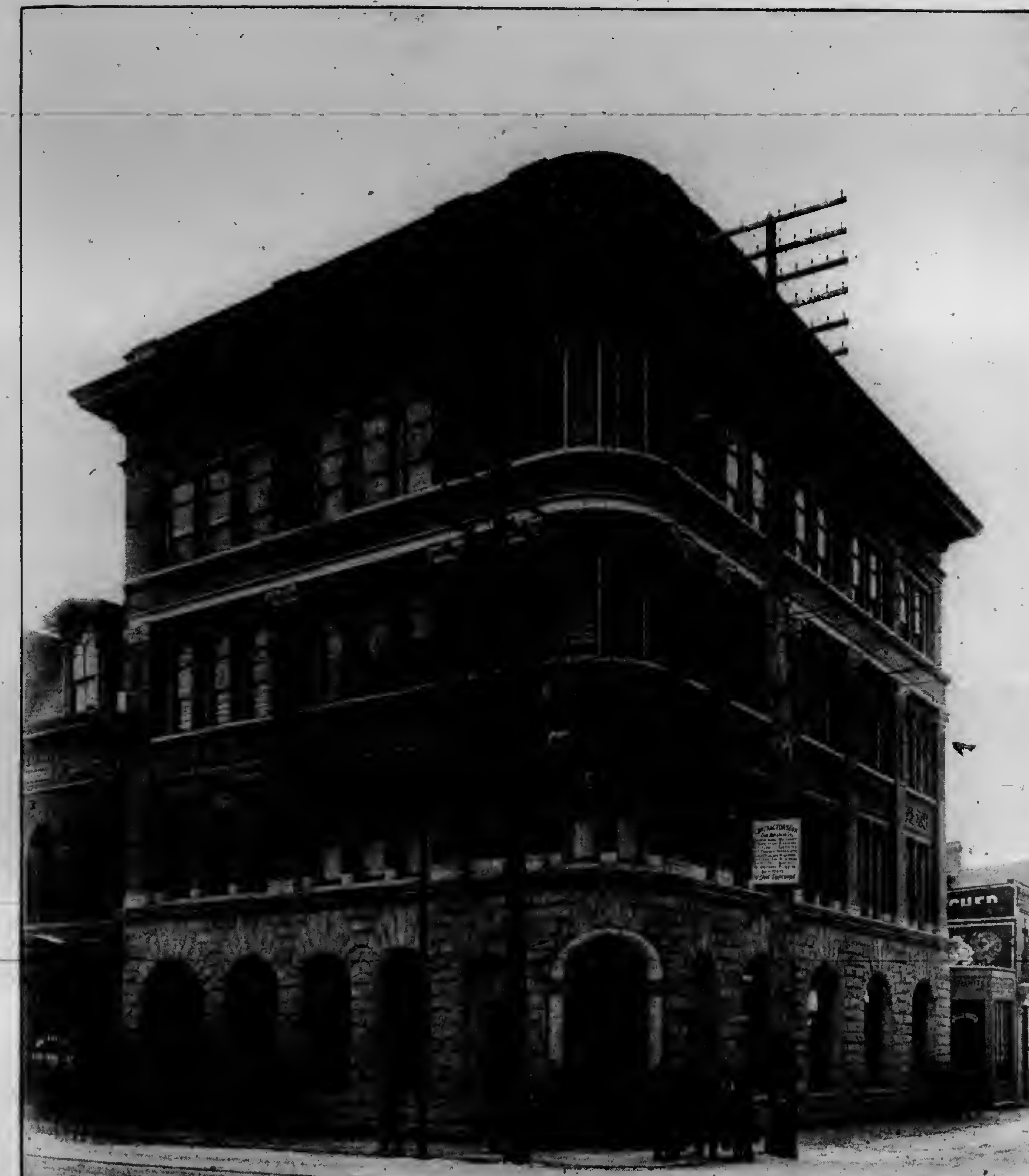

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TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Illinois Architects' License Bill. A BILL providing for the examination and licensing of architects and regulating the practice of architecture has passed the Legislature of the State of Illinois. The bill, which will doubtless have special interest for Canadian architects, in view of the efforts put forth in this direction by the Ontario Association of Architects, will be found printed on another page of this number.

American Institute of Architects. THE thirty-first annual meeting of the American Institute of Architects has been called to meet in Detroit, Mich., on the 29th and 30th inst. and Oct. 1st. Among the papers to be presented will be one by Mr. Cass. Gilbert, F.I.A., of St. Paul, Minn., on "Architectural Education and its Bearing on Membership in the Institute;" by Mr. Cliptson Sturgis, F.I.A., Boston, Mass., on "Church Architecture," and Mr. H. Rutgers Marshall, F.A.I.A., of New York, on "Architectural Truth." The committee to which was referred amendments to the constitution and by-laws will report numerous radical changes.

Public Bathing Facilities. APROPOS of our remarks in a recent issue on the necessity for the erection and maintenance of public bath houses in cities like Toronto and Montreal, it is learned that in upwards of fifty European cities the plan has been adopted of providing bathing facilities in public school buildings. In Berlin and other principal German cities, all new common school buildings are fitted up in this manner. The idea is one which might with advantage be adopted in connection with the public schools in the poorer districts in our Canadian cities. Bathing facilities in connection with the public schools would not do away with the necessity for one or more public bath houses, but would be to the latter a valuable auxiliary in improving and maintaining the public health.

Builders and Building Inspectors. THE National Association of Builders and the National Association of Building Inspectors of the United States, which are distinct organizations, are meeting simultaneously in annual convention in Detroit, Mich., at the present time. The subjects which will come up for discussion by the Building Inspectors are: Uniformity of Safe Loads for Building Floors; Adoption of a System of Uniform Definitions in Building Laws; Uniformity of Tests of Steel Construction and Best Methods of Safeguarding the Same Against Fire; Safe Means of

Ingress and Egress; Elevator Inspection; Boiler Inspection; Ventilation; Sanitation; Plumbing Inspection; Gas Fixtures Inspection; Appointment of Building Inspectors; Best Methods of Enforcing Building Laws; Electric Wiring in Buildings, etc. The Toronto City Council have appointed Mr. Coatsworth, City Commissioner, a delegate to this convention. We would like to indulge the hope that as the result of his visit the Council may be induced to revise the city building by-laws, substituting for the many glaring anomalies at present existing therein some of the carefully considered recommendations contained in the draft by-law prepared and submitted a year or two ago by the Ontario Association of Architects.

Cost of Operating Elevators.

The cost of operating elevators by steam, water and electricity has properly become the subject of careful investigation, in view of the extensive and growing use of these appliances. It is stated that in New York, the home of so many sky-scrapers, a larger number of persons are carried vertically in elevators than are transported horizontally by the various forms of traction. Experience with electric elevators in the United States is said to have shown the cost of carrying a useful load of 1,500 pounds to a height of 100 feet, inclusive of return to starting point, to be one cent. In Berlin and Vienna the cost is reported to be considerably below the figure mentioned. In the former city the cost of lifting by electricity a load of 850 pounds to a height of 80 feet, inclusive of descent, was only one-fifth of a cent.

National Art Commission.

A bill has been prepared by the Board of Managers of the Public Art League of the United States for presentation to Congress, which provides for the appointment of a National Art Commission. It is proposed that the Commission shall be charged with the duty of passing upon the merits of all works of art which may hereafter be purchased or constructed by the government. The bill provides that the commission shall be composed of the presidents of the American Institute of Architects, the National Sculpture Society, the National Academy of Design, and two other citizens of the United States, to be appointed for a term of six years, and from time to time, as vacancies occur, by the President of the United States. This is an extension of the idea advocated for several years past by the Ontario and Quebec Associations of Architects that there should exist in each of these provinces a qualified commission to whom should be submitted designs for public monuments, parks, squares and other improvements of an artistic character. We are pleased to note the growth of sentiment in this direction, and trust that it may shortly take practical form in Canada as well as the United States.

Speculative Building.

The business depression which settled down upon Toronto five or six years ago, due in large measure to the collapse of the real estate boom, was severely felt by speculative builders. In consequence of the drop in prices of real estate, in which most of them were more or less interested, their equities were wiped out, and they were stripped of their possessions. Under these circumstances, many of them removed from the city, and some from the country, in the hope of being able, amid more favorable surroundings, to start life over again and repair their shattered fortunes. Persons who had suffered by their operations were not loth to witness their departure, and the more legitimate class of builders comforted themselves with the reflection that when better times should return they would be free from the competition of the speculative builders. Recent observation, however, goes to show that some of the speculative builders of the boom days have managed to live through the dull times, and with the return of improved conditions are ready for business again. Owing to the great decline in land prices, these men are able to operate in even the best residential localities, the attractiveness of which they are likely to seriously impair, unless the building regulations are amended so as to compel the erection of a class of buildings suited to these localities.

Development of Trades Unionism.

The Building Trades Unions of Chicago are considering the best method of labelling buildings which have been entirely constructed by organized labor. The suggestion that a metal flag be adopted which should also serve as a weather vane, has met with favor. The idea is to provide a means by which the members of trades unions may distinguish and keep away from houses erected by "scab" labor. The ultimate end in view will no doubt be to boycott every occupant of a building which does not fly the union badge. The narrow-minded tyranny of some of the labor organizations is fast reaching the point where it will overstep the bounds of public tolerance and bring about its own defeat. Our readers will not be slow to recognize the ridiculousness of measures such as the one we are considering, but the originators are apparently oblivious to the fact that they are making themselves the laughing-stock of sensible minds. In Great Britain the unions are not less tyrannical. The bricklayers refuse to allow any but the sons of bricklayers to be apprenticed. The President of the National Association of Master Builders, in referring recently to the arrogant demands of the unions, expressed the belief that they would have to fight once for all as to whether capital should rule labor or labor rule capital. Recognizing as we do the interdependence of capital and labor, we would like to see these two forces working in harmony for the advancement of the best interests of the race, but it seems futile to hope that this desirable condition can come about so long as the labor organizations submit themselves to the leadership of unreasoning demagogues.

Competitive Designs for Government Buildings.

Canadian architects in common with those of the United States will be pleased to learn that the Tarusey Bill, passed by Congress in 1893, which provides for obtaining designs for government buildings by competition among the leading architects of the country, is to be put in operation at once. We publish elsewhere in this number the regulations which have been framed to govern these competitions. The first buildings to be erected on the competitive plan will be in Camden, N. J., and Norfolk, Va. There is little doubt that as the result of bringing to bear upon the designing of public buildings the best architectural talent of the country, there will come a marked improvement in the public architecture of the United States. The Dominion Government might, with advantage to the architectural profession in Canada and still greater advantage to the country, follow the example of the United States in throwing open to competition in the future the designing of public buildings. Such a step would give a much needed stimulus to Canadian architects, and the competition thus engendered would result in the erection of buildings in which both excellence and diversity of the design would be displayed. In view of the fact that a successor has not yet been appointed to the position made vacant by the recent retirement of Mr. Thos. Fuller, late Chief Architect of the Public Works Department, the present would seem to be an opportune time for the Government to consider and deal with this matter. It might be advisable for the Architectural Associations of Ontario and Quebec to memorialize the Government on the subject at this juncture.

Mexican Federal Palace Competition.

We have before us details of the requirements of the proposed Federal Palace for which an international competition for designs has been instituted. The printing of these details would occupy too large a portion of our space and is therefore not attempted. Should any Canadian architect feel a disposition to take a hand in the competition, he can by calling at this office see a copy of these requirements. The edifice will be constructed in the centre of an elliptical area, surrounding which will be structures of similar architectural composition. The principal conditions are that solidity and the rational employment of materials shall not be sacrificed to decorative fancies. The total cost must not exceed $1,500,000, without counting the foundations to the level of the street. The designs must be sent, accompanied by an explanatory specification and description written in Spanish, French and English, and estimate of cost, to the Ministry of Communications and Public Works, either directly or through the diplomatic or consular representatives of Mexico, on or before the 30th of November, 1897. The designs will be submitted to a jury composed of seven architects or civil engineers appointed, one by the Chamber of Deputies, one by the Senate, one by the Ministry of Communications and Public Works, and four by the candidates by means of a written ballot, from among ten experts proposed by the Ministry of Public Works. They must not be participants in the competition and will be chosen by the absolute majority of ballots. For this purpose the candidates must send with their drawings and specification a list containing the four names of the persons whom they choose as members of the jury. Before the award is made the official journal of the Government will publish the result of the ballot held for the formation of the jury, over which the Minister of Public Works or his representative will preside. There is here an opportunity for Canadian architects to distinguish themselves, and also for Canadian manufacturers of supplies to get a share of the orders for materials required in the fitting up of these important buildings.

BY THE WAY.

Another example of the low level to which architectural competitions in Canada have been reduced is now before us in a competition instituted by the St. Thomas Board of Education for plans for a twenty-room school building. The estimated cost of the building was $30,000, and the prizes offered were $50, $35 and $25 respectively. Seventeen architects are said to have submitted plans in this competition. The first prize has been awarded to E. T. Macdonald, of St. Thomas, the second prize to Neil Darrach, of St. Thomas, and the third prize to Mr. Ogilvie, of Toronto. I regret that I am not in a position to publish the names of all the competitors.

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A joint committee, appointed by the Royal Institute of British Architects and the College of Organists, to determine the most suitable position for church organs, recommends that as a rule the organ be placed at the west end of the church and the choir in two divisions at the sides of the nave.

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Senator Thurston, chairman of the special committee of the Senate upon International Expositions, has recommended that the appropriation of half a million dollars be made to cover the cost of an exhibit at the Paris Exhibition of 1900; also that provision be made for the expenses of five commissioners. Has the Government of the Dominion of Canada yet given any thought to this matter? Canada should have adequate representation at this Exhibition, which promises to eclipse all of its predecessors.

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A well known Toronto plumber related to me a bit of his experience the other day which seems to indicate that the conditions at present prevailing in the trade are by no means favorable to the making of profits. In view of the dull times, he determined to figure more closely than usual on a certain contract—in fact, his purpose was to make no allowance for profit, but simply to cover the cost of doing the work, and rest satisfied with keeping his workmen employed. After completing and sending in his tender, calculated on this basis, he was startled by the discovery that he had failed to take into account the cost of three boilers required by the specification. He hurried away to the company who had invited him to tender, and began to explain to them his mistake, when they interrupted him to remark in the coolest possible manner that the error was of no consequence, as they had received bids which were very much below the one he had submitted. Notwithstanding the unsatisfactory condition of the trade indicated by this incident, there are plumbing firms—some of them not old-established either—which appear to be doing a prosperous business.

BUILD WELL.

High on the granite wall the builders, toiling,
 Heaved up the massive blocks and slabs to place,
With swart and streaming brows and straining sinews,
 Under the summer's blaze.

And higher yet, amid the chills of autumn,
 Tier upon tier and arch on arch arose;
And still crept upward, coldly, wearily,
 'Mid winter's sifting snows.

From stage to stage up springs the master builder,
 Instructing, cheering, chiding here and there;
Scanning with scrutiny severe and rigid,
 Each lusty laborer's share.

Anon his voice to those most distant shouting,
 Through the hoarse trumpet makes his orders swell;
Or utters words like these to rouse and hearten:
 "Build well, my men, build well!"

"The ropes are strong, and new and sound the pulleys;
 The derrick's beams are equal to the strain;
Unerring are the level, line and plummet;
 Let nought be done in vain!

"Build that these walls to coming generations
 Your skill, your strength, your faithfulness shall tell,
That all may say, as storms and centuries test them,
 The men of old built well!"

THE NATIONAL ELECTRICAL CODE.

THE National Board of Fire Underwriters of the United States have finally adopted a code governing the installation and construction of electrical apparatus. The rules of most interest to architects are as follows:

CLASS D.—FITTINGS, MATERIALS AND DETAILS OF CONSTRUCTION.

All Systems and Voltages.

40. WIRE INSULATION—

a. Rubber Covered—The insulating covering must be solid, at least three-sixty-fourths of an inch in thickness and covered with a substantial braid. It must not readily carry fire, must show an insulating resistance of one megohm per mile after two weeks' submersion in water at seventy degrees Fahrenheit and three days' submersion in lime water, and after three minutes' electrification with 550 volts. (See page 44.)

b. Weatherproof—The insulating covering must not support combustion, must resist abrasion, must be at least one-sixteenth of an inch in thickness, and thoroughly impregnated with a moisture repellent.

c. Flexible Cord—Must be made of two stranded conductors, each having a carrying capacity equivalent to not less than a No. 16 B. & S. wire, and each covered by an approved insulation, and protected by a slow-burning, tough-braid outer covering.

1. Insulation for pendants under this rule must be moisture and flame proof.

2. Insulation used for cords used for all other purposes, including portable lamps and motors, must be solid, at least one-thirty-second of an inch in thickness, and must show an insulation resistance between conductors, and between either conductor and the ground, of at least one megohm per mile after one week's submersion in water at seventy degrees Farenheit, and after three minutes' electrification, with 550 volts.

3. The flexible conductors for portable heating apparatus, such as irons, etc., must have an insulation that will not be injured by heat, such as asbestos, which must be protected from mechanical injury by an outer, substantial, braided covering, and so arranged that mechanical strain will not be borne by electrical connection.

d. Fixture Wire—Must have a solid insulation, with a slow-burning, tough, outer covering, the whole to be at least one-thirty-second of an inch in thickness, and show an insulation resistence between conductors, and between either conductor and the ground, of at least one megohm per mile, after one week's submersion in water at seventy degrees Fahrenheit, and after three minutes' electrification, with 550 volts.

e. Conduit Wire—Must comply with the following specifications:

1. For insulated metal conduits single wires and twin conductors must comply with section (a) of this rule.

Concentric wire must have a braided covering between the outer conductor and the insulation of the inner conductor, and, in addition, must comply with section (a) of this rule.

2. For non-insulated metal conduits single wires and twin conductors must comply with section (a) of this rule, and, in addition, have a second outer fibrous covering, at least one-thirty-second of an inch in thickness, and sufficiently tenacious to withstand the abrasion of being hauled through the metal conduit.

Concentric conductors must have a braided covering between the outer conductor and the insulation of the inner conductor, and comply with section (a) of this rule, and, in addition, must have a second fibrous outer covering at least one-thirty-second of an inch in thickness, and sufficiently tenacious to withstand the abrasion of being hauled through the metal conduit.

41. INTERIOR CONDUITS—(For wiring rules, see Nos. 24 and 25.)

a. Each length of conduit, whether insulated or uninsulated, must have the maker's name or initials stamped in the metal, or attached thereto in a satisfactory manner, so that the inspectors can readily see the same.

Insulated Metal Conduits:

b. The metal covering, or pipe, must be at least equal in thickness, or of equal strength to resist penetration by nails, etc., as the ordinary commercial form of gas pipe of same size.

c. Must not be seriously affected externally by burning out a wire inside the tube when the iron pipe is connected to one side of the circuit.

d. Must have the insulating lining firmly secured to the pipe.

e. The insulating lining must not crack or break when a length of the conduit is uniformly bent at temperature of 212 degrees Fahrenheit to an angle of ninety degrees, with a curve having a radius of fifteen inches, for pipes of one inch and less, and fifteen times the diameter of pipe for larger pipes.

f. The insulating lining must not soften injuriously at a temperature below 212 degrees Fahrenheit, and must leave water in which it has been boiled practically neutral.

g. The insulating lining must be at least one-thirty-second of an inch in thickness, and the materials of which it is composed must be of such a nature as will not have a deteriorating effect on the insulation of the conductor, and be sufficiently tough and tenacious to withstand the abrasion test of drawing in and out of same long lengths of conductors.

h. The insulating lining must not be mechanically weak after three days' submersion in water, and, when removed from the pipe entire, must not absorb more than ten per cent. of its weight of water during 100 hours of submersion.

i. All elbows must be made for the purpose, and not bent from lengths of pipe. The radius of the curve in the inner edge of any elbow not to be less than three and one-half inches. Must have not more than the equivalent of four quarter bends from outlet to outlet, the bends at the outlets not being counted.

Uninsulated Metal Conduits:

j. Plain iron or steel pipes of equal thickness, or of equal strength, to resist penetration of nails, etc., as the ordinary commercial form of gas pipes of the same size, may be used as conduits, provided their interior surfaces are smooth and free from burs; pipe to be galvanized, or the interior surfaces coated or enamelled to prevent oxidization with some substance which will not soften so as to become sticky and prevent wire from being withdrawn from the pipe.

k. All elbows must be made for the purpose, and not bent from lengths of pipe. The radius of the curve of the inner edge of any elbow, not to be less than three and one-half inches. Must have not more than the equivalent of four quarter bends from outlet to outlet, the bends at the outlets not being counted.

42. WOODEN MOULDINGS—(For wiring rules, see No. 24.)

a. Must have, both outside and inside, at least two coats of waterproof paint, or be impregnated with a moisture repellent.

b. Must be made of two pieces, a backing and a capping so constructed as to thoroughly incase the wire, and provide a one-half inch tongue between the conductors, and a solid backing, which, under grooves, shall not be less than three-eighths of an inch in thickness, and must afford suitable protection from abrasion.

It is recommended that only hardwood moulding be used.

48 SWITCHES—(See Nos. 17 and 22.)

a. Must be mounted on non-combustible, non-absorptive, insulating bases, such as slate or porcelain.

b. Must have carrying capacity sufficient to prevent undue heating.

c. Must, when used for service switches, indicate, on inspection, whether the current be "on" or "off."

d. Must be plainly marked where it will always be visible, with the name of the maker and the current and voltage for which the switch is designed.

e. Must, for constant potential systems, operate successfully at fifty per cent. overload in amperes, with twenty-five per cent. excess voltage under the most severe conditions they are liable to meet with in practice.

f. Must, for constant potential systems, have a firm and secure contact; must make and break readily, and not stop when motion has once been imparted by the handle.

g. Must, for constant current systems, close the main circuit and disconnect the branch wires when turned "off"; must be so constructed that they shall be automatic in action, not stopping between points when started, and must prevent an arc between the points under all circumstances. They must indicate, upon inspection, whether the current be "on" or "off".

44. CUT-OUTS AND CIRCUIT BREAKERS—(For installation rules, see Nos. 17 and 21.)

a. Must be supported on bases of non-combustible, non-absorptive insulating material.

b. Cut-outs must be provided with covers, when not arranged in approved cabinets, so as to obviate any danger of the melted fuse metal coming in contact with any substance which might be ignited thereby.

c. Cut-outs must operate successfully, under the most severe conditions they are liable to meet with in practice, on short circuits with fuses rated at 50 per cent. above and with a voltage 25 per cent. above the current and voltage for which they are designed.

d. Circuit-breakers must operate successfully, under the most severe conditions they are liable to meet with in practice, on short

circuits when set at 50 per cent. above the current, and with a voltage 25 per cent. above that for which they are designed.

e. Must be plainly marked where it will always be visible, with the name of the maker, and current and voltage for which the device is designed.

45. FUSES—(For instalation rules, see Nos. 17 and 21.)

a. Must have contact surfaces or tips of harder metal having perfect electrical connection with the fusible part of the strip.

b. Must be stamped with about eighty per cent. of the maximum current they can carry indefinitely, thus allowing about 25 per cent. overload before fuse melts.

With naked open fuses, of ordinary shapes and not over 500 amperes capacity, the maximum current which will melt them in about five minutes may be safely taken as the melting point, as the fuse practically reaches its maximum temperature in this time. With larger fuses a longer time is necessary.

Inclosed fuses where the fuse is often in contact with substances having good conductivity to heat, and often of considerable volume, require a much longer time to reach a maximum temperature on account of the surrounding material which heats up slowly. This data is given to facilitate testing.

c. Fuse terminals must be stamped with the maker's name, initials, or some known trade mark.

46. CUT-OUT CABINETS—

a. Must be so constructed, and cut-outs so arranged, as to obviate any danger of the melted fuse metal coming in contact with any substance which might be ignited thereby.

A suitable box can be made of marble, slate or wood, strongly put together, the door to close against a rabbet so as to be perfectly dust tight, and it should be hung on strong hinges and held closed by a strong hook or catch. If the box is wood the inside should be lined with sheets of asbestos board about one-sixteenth of an inch in thickness, neatly put on and firmly secured in place by shellac and tacks. The wires should enter through holes bushed with porcelain bushings; the bushings tightly fitting the holes in the box, and the wires tightly fitting the bushings (using tape to build up the wire, if necessary) so as to keep out the dust.

47. SOCKETS—(See No. 27.)

a. No portion of the lamp socket, or lamp base, exposed to contact with outside objects, must be allowed to come in electrical contact with either conductor.

b. Must, when provided with keys, comply with the requirements for switches. (See No. 43.)

48. HANGER-BOARDS—

a. Hanger-boards must be so constructed that all wires and current carrying devices thereon shall be exposed to view and thoroughly insulated by being mounted on a non-combustible, non-absorptive insulating substance. All switches attached to the same must be so constructed that they shall be automatic in their action, cutting off both poles to the lamp, not stopping between points when started and preventing an arc between points under all circumstances.

49. ARC LAMPS—(For installation rules, see No. 19.)

a. Must be provided with reliable stops to prevent carbons from falling out in case the clamps become loose.

b. Must be carefully insulated from the circuit in all their exposed parts.

c. Must, for constant current systems, be provided with an approved hand switch, also an automatic switch that will shunt the current around the carbons, should they fail to feed properly.

The hand switch to be approved, if placed anywhere except on the lamp itself, must comply with requirements for switches on hanger-boards, as laid down in Rule 48.

50. SPARK ARRESTERS—(See No. 19c.)

a. Spark arresters must so close the upper orifice of the globe that it will be impossible for any sparks thrown off by the carbons to escape.

51. INSULATING JOINTS—(See No. 26a.)

a. Must be entirely made of material that will resist the action of illuminating gases, and will not give way or soften under the heat of an ordinary gas flame or leak under a moderate pressure. They shall be so arranged that a deposit of moisture will not destroy the insulating effect, and shall have an insulating resistance of at least 250,000 ohms between the gas-pipe attachments, and be sufficiently strong to resist the strain they will be liable to be subjected to in being installed.

b. Insulating joints having soft rubber in their construction will not be approved.

52. RESISTANCE BOXES AND EQUALIZERS—(For installation rules, see No. 4.)

a. Must be equipped with metal, or with other non-combustible frames.

The word "frames" in this section relates to the entire case and surroundings of the rheostat, and not alone to the upholding supports.

53. REACTIVE COILS AND CONDENSERS—

a. Reactive coils must be made of non-combustible material, mounted on non-combustible bases and treated, in general, like sources of heat.

b. Condensers must be treated like apparatus operating with equivalent voltages and currents. They must have non-combustible cases and supports, and must be isolated from all combustible materials and, in general, treated like sources of heat.

54. TRANSFORMERS—(For installation rules, see Nos. 11 and 33.)

a. Must not be placed in any but metallic or other non-combustible cases.

55. LIGHTNING ARRESTERS—(For installation rules, see No. 5.)

a. Must be mounted on non-combustible bases, and must be so constructed as not to maintain an arc after the discharge has passed, and must have no moving parts.

CLASS E.—MISCELLANEOUS.

56. INSULATION RESISTANCE—

The wiring in any building must test free from grounds, i.e., the complete installation must have an insulation between conductors and between all conductors and the ground (not including attachments, sockets, receptacles, etc.) of not less than the following:

Up to	5	amperes		4,000,000
"	10	"		2,000,000
"	25	"		800,000
"	50	"		400,000
"	100	"		200,000
"	200	"		100,000
"	400	"		50,000
"	800	"		25,000
"	1,600	"	and over	12,500

All cut-outs and safety devices in place in the above.

Where lamp sockets, receptacles and electroliers, etc., are connected, one-half of the above will be required.

57. PROTECTION AGAINST FOREIGN CURRENTS—

a. Where telephone, telegraph or other wires, connected with outside circuits, are bunched together within any building, or where inside wires are laid in conduits or ducts with electric light or power wires, the covering of such wires must be fire-resisting, or else the wires must be enclosed in an air-tight tube or duct.

b. All aerial conductors and underground conductors, which are directly connected to aerial wires, connecting with telephone, telegraph, district messenger, burglar-alarm, watch-clock, electric-time and other similar instruments, must be provided near the point of entrance to the building with some approved protective device which will operate to shunt the instruments in case of a dangerous rise of potential, and will open the circuit and arrest any abnormal current flow. Any conductor normally forming an innocuous circuit may become a source of fire hazard if crossed with another conductor charged with a relatively high pressure.

Protectors must have a non-combustible insulating base, and the cover to be provided with a lock similar to the lock now placed on telephone apparatus or some equally secure fastening, and to be installed under the following requirements:

1. The protector to be located at the point where the wires enter the building, either immediately inside or outside of the same. If outside, the protector to be enclosed in a metallic, waterproof case.

2. If the protector is placed inside of building, the wires of the circuit from the support outside to the binding posts of the protector to be of such insulation as is approved for service wires of electric light and power (see No. 40a) and the holes through the outer wall to be protected by bushing the same as required for electric light and power service wires.

3. The wire from the point of entrance to the protector to be run in accordance with rules for high potential wires, i.e., free of contact with building and supported on non-combustible insulators.

4. The ground wire shall be insulated, not smaller than No. 16 B. & S. gauge copper wire. This ground wire shall be kept at least three inches from all conductors, and shall never be secured by uninsulated, double-pointed tacks, and must be run in as straight a line as possible to the ground connection.

5. The ground wire shall be attached to a water pipe, if pos-

sible, otherwise may be attached to a gas pipe. The ground wire shall be carried to, and attached to, the pipe outside of the first joint or coupling inside the foundation walls, and the connection shall be made by soldering, if possible. In the absence of other good ground, the ground shall be made by means of a metallic plate or a bunch of wires buried in a permanently moist earth.

58. ELECTRIC GAS LIGHTING—

Where electric gas lighting is to be used on the same fixture with the electric light:

a. No part of the gas piping or fixture shall be in electric connection with the gas lighting circuit.

b. The wires used with the fixtures must have a non-inflammable insulation, or, where concealed between the pipe and shell of the fixture, the insulation must be such as required for fixture wiring for the electric light.

c. The whole installation must be free from "grounds."

d. The two installations must test perfectly free from connection with each other.

59. SOLDERING FLUID—

a. The following formula for soldering fluid is suggested:

Saturated solution of zinc chloride............ 5 parts.
Alcohol.................................... 4 parts.
Glycerine.................................. 1 part.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

SOME SUGGESTIONS TO THE O. A. A.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Is it not about time that the committee appointed by the Ontario Association of Architects some years ago to look after the æsthetic, archæological, historical, architectural and monumentally-decorative detail of this provincial capital, commenced to agitate in favor of something?

The building industry has been enjoying a recess for a spell, and no doubt the worthy architects composing this distinguished committee have been enabled to participate in the vacation along with the rest of us; surely, therefore, they might have racked their wits and put them to sume use in discovering data in this convention-visited city for their commemorative genius. If they are not hopelessly asleep I would like to suggest a few thoughts not unworthy the consideration of a respectable committee charged with the serious business of placing the Queen City on a proper art basis.

First, the reclaiming from the vandal Time, the lethargy of the Dominion Government, a squatter or two, and other evil influences, that half a dozen acres or so within the southern purlieus of the city, known as the "Old Fort."

The Old Fort has a history well worth preserving, and is not unworthy of a better fate than it receives. The Old Fort has been the scene of at least one sanguinary engagement, disastrous for both participating parties, but chiefly the invaders, when on the memorable 25th of April, in the year 1812, some weeks previous, perhaps, to the birth of the majority of the members of the committee aforesaid, the redoubtable General Pike invading the province attacked the Fort and was blown into oblivion, and various other directions, by the timely explosion of the powder magazine, the innocent result of a well planned accident on the part of one of our reckless regulars on sentry duty who happened carelessly to ignite the end of a fuse communicating with the interior of the magazine, just as the intepid Yankee was making his headlong way eastward across the Garrison Common towards the Fort. Peace to his ashes.

The curious old block houses of the Old Fort are in a good state of preservation, requiring but little to keep them so and attractive. They might be fitted up as a historical and military museum.

The embrasures and fortifications generally, such as they are, would be all the more presentable and picturesque by being restored; also the grand old guns would look more comfortable on less shaky carriages. Pyramids of cannon balls alongside would also add to the effect, besides being quietly suggestive to a certain class of visitors that we keep well awake.

The sidewalks of the Fort would be more in keeping if they were of a more permanent character than of pine, say of brick, and the roadway, instead of rambling all over the sward, be kept within bounds, a 20-foot gravel carriage drive with 6-inch stone kerbing on each side, the drive to make a detour and loop around the old guard house.

Why not look after the roadway also leading from the Old to the New Fort, plant a line of trees on each side and make a proper connection with the old military burying ground? In short, invoke the aid of the City Council to petition the Dominion Government to make a regular and systematic attempt at creditable maintenance of the Old Fort and all the great space beyond to the New Fort—including the making of a boulevard and drive 200 feet wide or so along the water-front from the Queen's Wharf to the ramparts of the New Fort, with proper approaches at either end and at the foot of Strachan avenue continued across the common. All of which I submit are eminently proper suggestions for the consideration of a wide-awake committee.

The Garrison Commons and Old Fort could be made wonderfully attractive without in any one feature destroying the utility of either for the purposes intended by the government, and the City Council could well afford to adopt a liberal policy in this direction. With the exhibition park and the New Fort at one end and the Old Fort at the other with all its historic reminiscences, together with the interesting little military cemetery, the place could be made quite as attractive and picturesque as the celebrated Hoe at Plymouth.

I would suggest that the Old Fort be dignified with a Gate (capital G) at the eastern entrance—nothing so costly, of course, or ambitious as the St. Louis or Kent Gates at Quebec—and yet something of a monumental character, built between the earth works, having an arched carriage entrance and a side entrance for pedestrians, built substantially of stone, with neat turrets and battlements, having a fortified appearance—something like a Gate, you know.

A tablet could be placed somewhere in the entrance, or over the central arch, recording the catastrophe of the sudden elevation of the Invincible Pike together with his staff of 200 aerial navigators; also the statement in prose or poetry of the fact that the British red coats and a company of English Hussars have from time to time made things lively within the precincts of the old stockade, recording the time of their occupation, together with the name of the companies. So much for the Old Fort.

2nd. What is to prevent the committee, if not too tired doing nothing, taking an active interest in the City Hall Square scheme, and the Governor Simcoe monument, about the necessity of either of which a whole volume might be written.

3rd. Why should Castle Frank be forgotten? Must this old historical land-mark be allowed to go uncared for and unsung—no glittering marble or eternal bronze or big round boulder to mark the identical site? Alas! alas! The very roadway to the place is eloquent with a hundred interesting reminiscences.

4th. Shame on the city—not one effort has been made by public or private enterprise to record the Victorian Jubilee, save the ludicrous burlesque at the recent Exhibition, when $20,000 was literally given to the winds, when half the amount would have perpetuated to generations that we are not altogether a city living on a reputation for loyalty only without the deed. Surely the committee on art and things, if still in existence, might take the representatives from other eminent bodies into its confidence and devise some means, however desperate, to save the city's historical records from dry rot and mildew and blight. Wake up, committee! Wake up! and show yourselves.

HUBUR G. PAULL.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE annual meeting of the Province of Quebec Association of Architects will be held in the City Hall, Quebec, on Thursday, September 30th, and Friday, October 1st. Members having any suggestions to make should forward the same to the secretary at as early a date as possible. The members are especially requested to prepare themselves to take an active interest in the meeting, and to bring forward questions for discussion. The programme is now being prepared. The transactions of the council for the year ending September 30th, 1897, will be printed and distributed to the members, in accordance with the resolution passed at the last meeting. This, it is hoped, will result in a more general discussion.

In October next the association enters upon the eighth year of its existence. Since its foundation it has been most useful and effective. The future will in a large degree depend upon the efforts put forth by the members of the association.

AMATEUR SKETCH CLUB.

An architectural sketch club has at last been formed in Montreal. Every person having an interest in architecture is eligible for membership. During past years such a step has many times been suggested, but the support offered did not seem sufficient to warrant any action. The organization will be known as the "Amateur Sketch Club," the object being to promote architectural sketching and study.

The club is now making arrangements and will shortly inaugurate a series of sketching tours. Draughtsmen and younger members are cordially invited to become members.

Until further notice correspondence should be addressed to the Amateur Sketch Club, Room 4, New York Life Building, Montreal.

ILLUSTRATIONS.

ST. NICHOLAS' CHURCH, RODMERSHAM, KENT.

CHURCH OF THE COVENANT, TORONTO.—GORDON & HELLIWELL, ARCHITECTS.

MEMORIAL FOR MOUNT ROYAL CEMETERY, MONTREAL.—BOND & SMITH, ARCHITECTS.

SUN LIFE INSURANCE BUILDING, MONTREAL.—JAMES & JAMES—J. WILSON GRAY, ASSOCIATED ARCHITECTS.

NEW BUILDING OF THE BELL TELEPHONE COMPANY, MONTREAL.—DAVID MAXWELL, ARCHITECT.

THIS company's new building, at the corner of Notre Dame and St. John streets, Montreal, contains the head office, eastern and local department offices, electrical engineering department, main exchange, distributing room, power room, and various other departments, including the Montreal agency. The Merchants Bank of Halifax occupies a large portion of the ground floor; the Royal Victoria Insurance Company and the Northern Electric & Manufacturing Co., Limited, have offices on the first floor, and the first and third floors are laid out principally for offices to be rented. A corridor ten by one hundred and thirty feet (10' x 130') long runs from Notre Dame street to Hospital street, with a large vestibule at each entrance. Off this corridor are the entrances to the elevators, stairways, Montreal agency, long distance booths and the banking room.

The vault in the bank was built by Messrs. J. & J. Taylor, Toronto, and is one of the most expensive and strongest safety deposit vaults ever built in Canada. The door of the vault, including the bolt work, is over a foot thick, made of chrome steel, according to the most modern practice in safe construction, and the walls, floor and ceiling are all of strength and thickness proportionate to the door. In connection with the vault are examining boxes for depositors and a book vault. There is also a directors' room, lunch and coat rooms, and a lavatory.

BELL TELEPHONE COMPANY.—HEAD OFFICE AND MAIN EXCHANGE, MONTREAL.

A NINETEENTH CENTURY SACRED ART.

BY J. W. L. FORSTER.

THE bare suggestion of it comes to us with a touch of novelty. Has anyone dared to say there is such a thing? Many have said there is not. Are there indeed signs of the times we have not discerned? As with mining prospectors there is sometimes a question whether a trace of silver may, instead of indicating a vein of that precious metal, only make more emphatic the test-proofs that the vein is lead; so may the presence here and there of a sacred picture prove the art of to-day to be only very secular indeed. Indications are, however, clear enough to give zest to inquiry, and to assure us that the few minutes so given will not be without interest.

I do not intend to speak of Christian art in its general application, as that refers to an era distinct from the Pagan era which preceded it, but only of that province in the choice of subject that has received by consent the name Sacred Art. As to a definition of this term opinions are not unanimous; a brief review therefore of the conditions which affect it may perhaps make clearer the character of art falling within the limits called sacred.

In studying these conditions we have to note that Christianity, which had in earlier centuries dismantled Pagan temples, and in a spasm of prurience broken and pulverized their statues, instituted the monastery, into whose sanctuary men retired who wished to be holy. A large part of their leisure was there given to ornamental work, with the invention from time to time of new features to supersede the old. Penmanship was followed by wood-carving, then by pottery, glass-work, illuminating, stone-carving, higher architecture, painting. Cathedrals arose and convents increased in number; for the Christian church grew rich amongst people whose souls she guarded and whose enterprises she blessed. And as the patronage of the church was bestowed, as it is the rightful privilege of wealth to bestow it, upon merit and skill, skill naturally sought the cloister and soon made its home there. In such environment the themes of the religious writings, particularly those in the ancient Scriptures—ever picturesque and grand—stirred the pulses of the artists to achieve, in drawings and color, representations of those hallowed scenes. Outside the cloister men were of two classes—nobles and slaves. To be noble was to fight and win, and then fight to defend the winnings; to be a slave was to toil and moil for life and master, and fight whenever summoned in the master's cause. There was little chance for culture; "little reck on soft virtues for soldiers, art was for the men with petticoats." Such conditions could not well produce other than a monastic art.

It may here be noted that the political combinations and struggles, into which, alas! the Christian church was too often

dragged, culminated in the great conflict whose arena was transferred from Germany to Northern Italy. When Ghibellines and Guelfs had exhausted every resource of men and money, and every princely family was somewhat hard-pressed, many of the petty chieftains of the north, who had become mercenary to either faction, settled down with their freebooting retainers, or squatted we ought to say, upon the soil of Tuscany. And, as already men had begun to know their value as fighters, their personal value in a political equation was likely to be considered. Quite naturally then, the advent of sturdy Northmen, who gloried in their personal freedom, transmitted a sort of contagion of unrest to the more patient vassals on the Tuscan plains. Thence to the cities spread an awakening towards a sense of man's individuality, or his value to himself as well as to the state. This was the day-break of a new era. When the aurora of this new age darted above the horizon in Italy, the artists, instead of servilely painting conventual designs at the command of their superiors, began also to think for themselves, with the result that there soon appeared the master-pieces of Cimibue, Di Grandi, Da Vinci, Raffæl, Angelo.

With the releasing of the grip of Italian feudalism upon thé bodies and minds of its minions, both art and letters responded to the impulse of expansion. But the nobles were poor and the church was rich; consequently, she that had nursed a feeble art in the cell of her convents through the dark ages, became its patron when it afterwards grew strong in the free air of a renaissance. The artists, who were not monks, remained worshippers at the shrines of the church, and so between the patron and the worshipper was evolved the sacred art that is the standard by which art, both sacred and secular, has ever since been measured.

In looking for the causes of its decline we see the further tribulations which befell the Christian church. History has already made us familiar with the frequent and unfortunate alliances into which it was led by knights-bishop and knights-errant during the stormy centuries that succeeded the scarcely less stormy Crusades. Years they were, darkened with a moral effeminacy that reached its climax of folly ultimately in a widespread sale of indulgences which shocked the conscience of the world, and in a general moral paralysis that did not greatly revive even under the galvanism of the Reformation. During later years the successors of Raffæl (a noble line of painters, including Dominichino, Fra Angelico and many, many such), reproduced from the cloister reflections mostly of his great master-pieces. What moral decrepitude began political revolutions completed, and to-day the shattered remnants of the ecclesiastical strongholds of mediæval Europe serve but to show where temporal sovereignty of the church, together with the studio of the cloister, once existed. But while these destructive forces were at work there was a constructive element plainly visible also. Independent tribes became welded into nations; feudal states gradually grew into kingdoms and turbulent chaos was metamorphosed into a cosmos somewhat resembling peace. Rulers received their crowns from Episcopal hands, but eventually wearied of the constant interferences of ecclesiastics, with the inevitable result that kingly patronage was given in the course of time to Painters-Royal. Commissions for historic pictures lured the pencils of the artists away from biblical designs; the popularity of the monastery as a picture mart declined; Sacred Art grew feeble, and still is mourned as dead.

Through this review of early conditions affecting Sacred Art, we are aware of its limits and are better prepared for a definition of the term. Sacred Art, as generally understood, treats of Bible themes, embracing the worship of God, the observances and sacred acts of the prophets, of the disciples of Christ and the priests of the temple, together with historic incidents in the life of Christ. Around these may be grouped events in the lives of devout members of the Christian church, who have been in later years canonized by its councils. Here the classification ends. Much of the latter material might properly be termed religious art, treating as it does the ceremonials and religious rites of the Christian church, and the signification of "sacred" be limited to apostolic themes. But there is no evidence that such distinction has ever been made by the church that has given us both theme and picture, nor by any writer on the subject. We must therefore accept this definition as canonic; and in doing so it will be seen the barriers set up are strong, nor do they confine us within a very narrow sphere.

The effort to limit Sacred Art to its old barriers is manifestly as great as to confine the City of London within the radius of the music of Bow Bells, or within the confines of the old wall. While a vast population hives around her it draws life from her heart and is known by her name, so within the province of Sacred Art and around its heart there would seem rightfully to cluster all those themes that live upon the story and teaching of the Book of Books.

It will be wise now in the interest of our theme to look for a few moments at the nineteenth century itself and note its influence upon art. Its tendencies ought to be considered, the national movements and local influences as well, and the men who stand at the gateways of its history. This age is characterized by a scrutiny of every material and condition that effects a truth even if that truth have in it man's temporal well-being or eternal salvation. Three centuries ago, owing to prevalent illiteracy, faith was narrower even if it was necessarily stronger, in the intercourse of trade amongst the people, or in regard to the teachings of the only educated class of that day. It was providential, as I understand the term, that the magic lever of knowledge was held in the hands of a community whose raison d'etre was their belief in a God of holiness, and a Christ Redeemer of the souls of men. Their teachings saved the race from moral extinction, and it stamped the record of the people's simple faith upon the missiles and panels and canvases that shame the impious banter of half-enlightened scoffers to-day. But this century permits men to probe deeper into the mystery of God and to perceive profounder meaning in the teachings of Jesus, and more all-touching signficance in His life.

That the art of to-day feels the influence of this scrutiny is certain. Many of the pictures within the sacred circle express a devoutness less formal and more unconscious; possess less stage manner and more altruism; exhibit less of the adornment and precision of the conventicle and more of the pathos of the soul that has learned for itself the meaning of vicarious suffering right down in the throbbing populations of the world.

It is here where a notable difference will be observed distinguishing the religious art of this period from that of the medieval epoch. In the matter of reverence it appears to me the spirit of the present day is not wholly divined. If the art of the years yield any verdict on this questioo it is in confirmation of the excellence of the latter manner. Reverence, as represented of old seemed impregnated with more than a trace of despair and gloom, oow it is awed by the omnipotence of mercy, and dares to hope.

A thought or two now in regard to national influences. It is true the great mass of the population of France, and in some measure Germany, under the magic of Voltarian ridicule drifted from moral moorings, unrestrained by any conviction of accountability. Accepting only the enlightenment of reason they were carried on by an easy current into the naturalism, which, under every change of literary creed, existed as the dominant cult during the first half of this century. About the middle of the century another revolution, more enlightened than the former, brought back the estranged heart of the populace to a moral sense if not to religious subserviency. For it seems to have been immediately after this that science began to speak for morality as a necessity. It is true it did not contribute to faith in God, but rather to aetheism, but at the same time the christian sentiment that claims a good code of morals as its great bulwark made some advance.

In England the religious movements that once more redeemed the people and saved the nation, as is asserted by the eminent encyclopedist, Dr. Cunningham Geikie, have given little in the way of direct art, except in illustrated publications which are voluminous and influential, but which I have not space to notice more fully in this paper, but they have left us a better social code so that the sentiment breathed into pictures partakes of more domestic and purer virtue than continental art as a whole, or than is to be discovered in the art of any former period. An opinion prevails that the wholesome spirit of British home life has, through most of this century, by the instrumentality of literature and art, exerted some influence upon the schools of Western Europe. For certain it is that the last half of this century, in spite of its scientific agnosticism and ruthless demolition of creeds, has manifested a spirit not at all hostile to art of a religious character. National influences have not been unfavorable to the growth of sacred art.

It may be in place here to express an opinion, namely, that though France has given evidence of artistic power unrivalled by any nation, and Britain, with her self-contained, insular religious devotion has a mental soil well prepared for it, it remains for Germany to produce the master types of recent sacred art. Sir Noel Paton's sermons in color are impressive, but they do not impress like Christ healing a sick child by Gabriel Max. Edwin Long's "Diana or Christ" in his greatest work, but it is not equal

to Hoffman's "Christ in the Temple". Uhde's homely peasant groups tell their sacred story with a naivete that is touching. So with Skredswig, the Norwegian and Karl Bloch, the Dane. Delug preached the gospel of sympathy, of love and sorrow in his very impressive picture called "Holy Women". Munkacsy's "Christ before Pilate", though painted by a German, was painted in French atmosphere, and is more realistic than mystic in character. But "The Raising of Jairus" Daughter by Max truly leaves nothing to be desired in recent Sacred Art.

The characteristics of race are a factor that should find a place in this discussion. There is, however, only time to say that subjects in sacred art as treated by painters of the Latin race partake to a great degree of the romantic or traditional history of the Christian church, while the Teuton artists seem attracted more to the significant life and work of Christ himself. These race characteristics will likely prove an important factor because of the recent art movements, which have been more active in the zone dominated by the Teuton.

But space is too limited to allow further reference to comparative qualities amongst schools, and the painters who have told with sincerity and dignity the story that is not yet half told. There is but time to refer to quantity. In doing this, even if we leave out of reckoning the wider view of its province and confine ourselves to the most limited classification laid down earlier in this paper, a review of the catalogues of the Royal Academy for the ten years past reveals at least seven sacred pictures each year, the Salons of France ten, Munich ten, Berlin ten, and so on. Spain, Italy, Russia, Netherlands, each brings its quota of recruits to the ranks of sacred art; so that the annual muster numbers at the lowest computation one hundred and fifty.

If for the sake of a severer and more careful selection we place the number at one hundred, the decade has added one thousand purely sacred pictures of highest merit to our gallery.

In conclusion let me add a fact that it will be well to note, that in the former era of Sacred Art, personal recompense by means of commissions given by a wealthy paternal institution helped greatly to inspire the artists then to paint religious subjects, while in these times such pictures are, without challenge, mainly the work of an unsuggested impulse.

If such be the fact, the claim that there is an influential Nineteenth Century Sacred Art appears to be well sustained; and it may be that there is in this fact a prophecy that shall realize a bright fulfilment in the twentieth century so near at hand.

ILLLINOIS ARCHITECTS' LICENSE BILL.

SECTION 1. Be it enacted by the People of the State of Illinois, represented in the General Assembly, That within thirty days after the passage of this act the Governor of this State shall, by the advice and consent of the Senate, appoint a State Board of Examiners of Architects, to be composed of five members, one of whom shall be a member of the faculty of the Illinois State University, and the other four shall be architects residing in the State of Illinois, who have been engaged in the practice of architecture at least ten years. Two of the said practicing architects appointed as examiners shall be designated to hold office for two years from the date of the passage of this act, and the other two, together with the member of the faculty aforesaid, shall hold office for four years from the passage of this act; and thereafter, upon the expiration of the term of office of the person so appointed, the Governor of the State shall appoint a successor to each person whose term of office shall expire, to hold office for four years, and said person so appointed shall have the above specified qualifications. In case appointment of a successor is not made before the expiration of the term of any member, such member shall hold office until a successor is appointed and duly qualified. Any vacancy occurring in the membership of the board shall be filled by the Governor of the State, for the unexpired term of such membership.

SECTION 2. The members of the State Board of Examiners of Architects shall, before entering upon the discharge of their duties, make and file with the Secretary of State the constitutional oath of office; they shall, as soon as organized, and annually thereafter, in the month of January, elect from their number a president and a secretary, who shall also be a treasurer. The treasurer shall file a bond for the penal sum of $5,000 with the Secretary of State, to be accepted by the Governor of State before entering upon his duties. The Board shall adopt rules and regulations to govern its proceedings, not inconsistent with this act, and a seal, and the secretary shall have the care and custody thereof, and shall keep a record of all the proceedings of the board, which shall be open at all times to public scrutiny. The secretary of the board shall receive a salary which shall be fixed by the board, and which shall not exceed the sum of fifteen hundred dollars ($1,500) per year; he shall also receive his travelling and other expenses incurred in the performance of his official duties. The other members of the board shall receive the sum of ten dollars ($10) for each day actually engaged in this service, and all legitimate and necessary expenses incurred in attending the meetings of said board; said expense shall be paid from the fees received by the board under the provisions of this act, and no part of the salary or other expenses of the board shall be paid out of the State treasury. All moneys received in excess of the said per diem allowance and other expenses above provided for, shall be held by the treasurer as a special fund for meeting the expenses of said board, and the cost of an annual report of the proceedings of the State Board of Examiners of Architects.

Provided, however, that when the money in the hands of the treasurer at the time of the annual report is rendered, exceeds twenty-five hundred dollars ($2,500), the amount of such excess shall be paid into the State treasury, to the credit of the State Board of Examiners of Architects.

SECTION 3. Three members of the board shall constitute a quorum. Special meetings of the board shall be called by the secretary upon the written request of any two members, by giving at least seven days' written notice of the meeting to each member, reckoning from the day on which the notices are post-marked, telegraphed or personally delivered. The board shall adopt rules and regulations for the examination of applicants for licenses to practice architecture, in accordance with the provisions of this act, and may amend, modify and repeal such rules and regulations from time to time. The board shall, immediately upon the election of each officer thereof, and upon the adoption, repeal or modification of its rules of government or its rules and regulations for examination of applicants for licenses, file with the Secretary of State, and publish in at least one architectural journal and one daily newspaper, published in the State of Illinois, at least twice, the name and address of each officer, and a copy of such rules and regulations, or the amendment, repeal or modification thereof.

SECTION 4. Provision shall be made by the board hereby constituted for holding examinations at least twice in each year, of applicants for licenses to practice architecture, and any person over twenty-one years of age, upon payment of a fee of fifteen dollars ($15) to the secretary of the board, shall be entitled to an examination for determining his or her qualifications. All examinations shall be made directly by said board, or a committee of two members delegated by the board, and due notice of the time and place of the holding of such examinations shall be published, as in the case provided for the publication of the rules and regulations thereof. The examination shall have special reference to the construction of buildings, and a test of the knowledge of the candidate of the strength of materials, and of his or her ability to make practical application of such knowledge in the ordinary professional work of an architect, and in the duties of a supervisor of mechanical work on buildings, and should also seek to determine his or her knowledge of the laws of sanitation as applied to buildings. If the result of the examination of any applicant shall be satisfactory to a majority of the board, under its rules, the secretary shall, upon an order of the board, issue to the applicant a certificate to that effect, and upon payment to the secretary of the board by the candidate of a fee of twenty-five dollars ($25), he shall thereupon issue to the person therein named a license to practice architecture in the State, in accordance with the provisions of this act, which license shall contain the full name, birthplace and age of the applicant, and be signed by the president and secretary, and sealed with the seal of the board. If an applicant fails to pass said examination, his or her fee shall be returned.

All papers received by the Secretary in relation to applications for license shall be kept on file in his office, and a proper index and record shall be kept by him.

SECTION 5. Any person who shall, by affidavit, show to the satisfaction of the State Board of Examiners of Architects that he or she was engaged in the practice of the profession of architecture on the date of the passage of this act, shall be entitled to a license without an examination, provided such application shall be made within six months after the passage of this act. Such license, when granted, shall set forth the fact that the person to whom the same was issued was practicing architecture in this State at the time of the passage of this act, and is, therefore, entitled to a license to practice architecture, without an examination by the board of examiners, and the secretary of the board shall, upon the payment to him of a fee of twenty-five dollars ($25), issue to the person named in said affidavit a license to practice architecture in this State, in accordance with the provisions of this act. In the case of a co-partnership of architects, each member whose name appears must be licensed to practice architecture. No stock company or corporation shall be licensed to practice architecture, but the same may employ licensed architects. Each licensed architect shall have his or her license recorded in the office of the county clerk in each and every county in this State, in which the holder thereof shall practice, and he or she shall pay to the clerk the same fee that is charged for the recording of notarial commissions. A failure to have his or her license so recorded shall be deemed sufficient cause for revocation of such license.

SECTION 6. Each county clerk shall keep in a book, provided for the purpose, a complete list of all the licenses recorded by him under the provisions of this act, together with the date of the issuance of each license.

SECTION 7. Every licensed architect shall have a seal, the impression of which must contain the name of the architect, his or her place of business, and the words, "Licensed Architect," "State of Illinois," with which he shall stamp all drawings and specifications issued from his office, for use in this State.

SECTION 8. After six months from the passage of this act it shall be unlawful, and it shall be a misdeamor punishable by a

fine of not less than fifty dollars ($50), nor more than five hundred dollars ($500), for each and every week during which said offense shall continue, for any person to practice architecture without a license in this State, or to advertise, or put out any sign or card, or other device which might indicate to the public that he or she is entitled to practice as an architect.

SECTION 9. Any person who shall be engaged in the planning or supervision of the erection, enlargement or alteration of buildings for others, and to be constructed by other persons than himself, shall be regarded as an architect within the provisions of this act, and shall be held to comply with the same; but nothing contained in this act shall prevent the draftsmen, students, clerks of works or superintendents, and other employes of those lawfully practicing as architects, under license as herein provided for, from acting under the instruction, control or supervision of their employers, or shall prevent the employment of superintendents of buildings paid by the owners from acting, if under the control and direction of a licensed architect who has prepared the drawing and specifications for the building. The term building in this act shall be understood to be a structure, consisting of foundations, walls and roof, with or without the other parts; but nothing contained in this act shall be construed to prevent any person, mechanic or builder, from making plans and specifications for, or supervising the erection, enlargement or alteration of any building that is to be constructed by himself or employes; nor shall a civil engineer be considered as an architect unless he plans, designs or supervises the erection of buildings, in which case he shall be subject to all the provisions of this act, and be considered as an architect.

SECTION 10. Architects' licenses issued in accordance with the provisions of this act shall remain in full force until revoked for cause, as hereinafter provided. Any license so granted may be revoked by unanimous vote of the State Board of Examiners of Architects for gross incompetency, or recklessness in the construction of buildings, or for dishonest practices on the part of the holder thereof, but before any license shall be revoked such holder shall be entitled to at least twenty days' notice of the charge against him, and of the time and place of the meeting of the board for the hearing and determining of such charge. And on the cancellation of such license it shall be the duty of the secretary of the board to give notice of such cancellation to the county clerk of each county in the State in which the license has been recorded, whereupon the clerks of the counties shall mark the license recorded in his office cancelled. After the expiration of six months from the revocation of a license, the person whose license was revoked may have a new license issued to him by the secretary upon certificate of the Board of Examiners, issued by them upon satisfactory evidence of proper reasons for his reinstatement, and upon payment to the secretary of the fee of five dollars ($5).

For the purpose of carrying out the provisions of this act relating to the revocation of licenses, the board shall have the power of a court of record, sitting in the county in which their meeting shall be held, and the power to issue subpœnas and compel the attendance and testimony of witnesses. Witnesses shall be entitled to the same fees as witnesses in a court of record, to be paid in like manner. The accused shall be entitled to the subpœna of the board for his witnesses, and to be heard in person or by counsel in open public trial.

SECTION 11. Every licensed architect in this State who desires to continue the practice of his or her profession shall annually, during the time he or she shall continue in such practice, pay to the secretary of the board during the month of July a fee of five dollars ($5), and the secretary shall thereupon issue to such licensed architect a certificate of renewal of his or her license for a term of one year. Any licensed architect who shall fail to have his or her license renewed during the month of July in each and every year, shall have his or her license revoked at the discretion of the board. But the failure to renew said license shall not deprive him or her of the right to renewal upon payment of said fee.

SECTION 12. Within the first week of December, after the organization of the board, and annually thereafter, the secretary of the board shall file with the Auditor of the State a full report of the proceedings of the board, and a complete statement of the receipts and expenditures of the board, attested by the affidavits of the president and secretary, subject to the approval of the State Auditor.

At a recent meeting of the stockholders of the Central Bridge and Engineering Company, Limited, of Peterboro', Ont., the following board of directors was elected: Messrs. William Cluxton, John Carnegie, James Kendry, F. J. Rogers and R. A Morrow. Messrs. Carnegie and Kendry were subsequently appointed president and vice-president respectively.

The Toronto and Hamilton Sewer Pipe Company's works at Hamilton were recently damaged by fire to the extent of $15,000. The loss was well covered by insurance. As the company have another factory in another part of the city, their business suffered no interruption in consequence of the accident. The damage caused by the fire is being speedily repaired. Meanwhile manufacturing operations are going on as usual.

The construction of a large breakwater at Buffalo was recently stopped owing to the decision of the collector of customs at that port to impose a duty upon the stone, which was being imported for the work from quarries in Canada. Previous to entering into the contract with the government, the contractors consulted the Treasury Department and received the assurance that no duty would be incurred. After considerable delay and correspondence the secretary of the Treasury Department has instructed the collector of customs at Buffalo to admit the stone pending the final settlement as to the rate of duty and by whom to be paid.

MANUFACTURES AND MATERIALS

GLASS COLORING BY PENETRATION.

COLORED glasses are generally produced by fusing oxides with the glass; the whole mass is colored. Leon Lemal colors the surface by penetration, and obtains, according to "La Nature," colored patterns of striking novelty. A bit of silver salt is placed on the glass, and the glass heated up to 500 or 550° Centigrade; the excess of salt having been removed, the surface will appear of a more or less deep yellow. The depth to which the color penetrates depends upon the time, the shade upon the quantity of salt applied. In five minutes the top layer of glass, 0.17 millimetres in thickness, was colored; after an hour that thickness was doubled; in 18 hours a plate 1.6 millimetres ($\frac{1}{16}$in.) thick was colored throughout. The color appears in both reflected and transparent light, and the yellow is said to be distinguished by a fine greenish or bluish fluorescence. Other methallic salts can be used, gold, copper, iron; silver with a little copper gives a red. The process is exceedingly simple. To transfer a lace pattern upon glass, it suffices to dip the lace into very diluted solution of nitrate of silver and then into potassium sulphide. Photographic collodion negatives can be directly applied to the surface.

Messrs. Warden King & Son, of Montreal, manufacturers of the Daisy hot water boiler, have recently appointed the Toronto Radiator Manufacturing Co., Limited, of Toronto, as their Ontario selling agents.

The Ontario Sewer Pipe and Brick Manufacturing Company's property at Mimico, Ont., was recently purchased by Mr. S. M. Nease, of Pittsburg, Pa. It is understood to be the intention to form a new company to operate the works under the old name.

It is reported that a company is being formed at Orangeville to establish cement manufacturing works, a large deposit of marl having been discovered in that locality. The deposit is said to consists of about 350 acres, and satisfactory tests of the material are reported to have been made.

Gypsum is reported to have been found in the Lake St. Martin district. A test of a sample about 10 or 12 inches square and 3 inches thick showed it to be free from foreign substances. The end of the vein, where first discovered, is about 6 by 3 feet, and the vein has been traced for four miles.

Mr. Samuel Cabot, the well known manufacturer of shingle stains, of Boston, Mass., is sending out a very effective color-combination chart, showing sixteen separate and distinct combinations. The chart, which may be had for the asking, should be of assistance to architects in the selection of colors that will blend harmoniously.

The Ontario Radiator Company, Limited, of Toronto, are negotiating with the city authorities of St. Thomas with a view to the location of their works in that city. They desire that the city should give them $10,000 or $15,000, or that the citizens should subscribe this amount in stock. The company agree to employ from 30 to 100 hands.

Mr. E. E. Sheppard, Government Trade Commissioner to the South American Republics, states in his report recently presented to the Government, that a large amount of school furniture is purchased by the Mexican Government, and that Canada should get a share of the orders in this line. The report also states that Canadian steel clad baths have been successfully introduced into Mexico through the agency of a prominent local plumbing firm.

A deputation from the Toronto Trades and Labor Council recently waited upon the City Council and asked that in all contracts yet to be awarded on the new City Buildings preference should be given to local manufacturers. They suggested that a preference of 10 per cent. would be sufficient. While it may not be found expedient to restrict the giving of contracts to Toronto contractors, it is very desirable that as few of them as possible should go beyond the bounds of the Dominion.

A number of well known engineers and contractors assembled recently at the Canadian Locomotive and Engine Company's works at Kingston, Ont., to witness tests of steel pipes manufactured from flat steel sheets rolled cold by machinery without the aid of furnaces or heating agencies. The process is the invention of F. A. Williams, of Wolverhampton, England. Two plates are employed in the manufacture of each pipe. They are bound together by means of two bars of steel rolled to a channel section. These bars are placed internally in the pipe and the edges of the ribbed plates set into the recesses in the channel bars. The pipe is then bound by two concavo-convex bars, which run the entire length of the pipe and fit into the channel between the nibbed edges of the plates. The pipe, when fitted together ready for rolling down, is shipped on a cast-iron mandrel on the rolling-down machine, which exerts great pressure upon the two wedges and flattens them in such a manner that they are securely locked in the channel bars, and bind the edges of the nibbed plates so effectively that the pipes, when tested, are found to be absolutely water-tight. At the test above referred to, the pipe was closed at the ends by caps and filled with water. A large pressure was then put on by a testing pump; the gauge is said to have registered 300 pounds without any sign of leakage or weakness.

PERSONAL.

Professor Butler, of King's College, Nova Scotia, has been appointed Professor of Civil Engineering at the Royal Military College, Kingston, Ont.

The announcement has recently been made in the daily press that Hon. Wm. Harty, Minister of Public Works for Ontario, is rapidly improving in health.

Messrs. Gordon & Helliwell, architects, have recently removed their offices from 26 King Street east, Toronto, to the third floor of the Confederation Life Building.

Mr. J. H. Tromanhauser, architect, while superintending the erection of a grain elevator at Kingston, Ont., had his foot severely crushed by a falling timber.

Mr. J. W. L. Forster, the well-known portrait painter, has recently returned to Toronto, after an absence of five months spent in Europe, principally in the Channel Islands.

Professor Sparkes, principal of the Government Art School at the South Kensington Museum, London, recently paid a visit to the Hamilton Art School, and delivered an address to the students.

Mr. E. Coatsworth, City Commissioner of Toronto, was deputed by the City Council to attend the convention of the National Association of Building Inspectors of the United States, which has just concluded its sessions in Detroit, Mich.

At a recent meeting of the Toronto Master Plumbers' Association, the resignation of Mr. Burroughes, the president, was accepted. Mr. J. B. Fitzsimmons was elected to the position. Mr. James Wilson was elected vice-president, and Mr. J. E. Nott second vice-president.

Messrs. H. Simpson and J. A. Ellis, architects, of Toronto, recently formed a partnership. It is now learned that Mr. F. T. Hodgson, of Collingwood, has also become a member of the firm, which will be known as Hodgson, Simpson & Ellis, with offices at Collingwood and Toronto.

Mr. Joseph Wright, president of the Canadian National Association of Master Plumbers, and Mr. F. H. Herbert, architect, of Toronto, were recent visitors to New York. Mr. Wright is said to have been in consultation with the officials of the National Association of the United States with a view to bringing about the affiliation of the Canadian Association with that organization.

At the Foresters' tent on the Industrial Exhibition Grounds, Toronto, on Sept. 6th, Mr. Geo. W. Gouinlock, architect of the new Temple Building, was presented with a gold Maltese cross, representative of the Chavelier Order. The medal bore the inscription, "Presented by the Supreme Court to Brother G. W. Gouinlock for distinguished services, September, 1897." The presentation was witnessed by a large company.

Let me ask, says Mr. Andrew Carnegie in a recent address, under what conditions does the employer of labor make profits and become prosperous? Only when labor is prosperous, is his reply, and in great demand; when wages are the highest, and when the demand for his products are the greatest. Then, and then only, is the employer prosperous. On the other hand, when labor is not fully employed, and can be obtained for the lowest wages; when there is little demand for his products, then the employer can never be prosperous. In most cases he must not only make profits, but he must see his capital impaired month after month; he cannot gain, he must lose. Before the employer can be prosperous; prosperity must exist throughout the land.

LEGAL.

IT is an unwise course for a builder to act in defiance of local by-laws, says the Builder's Reporter. Courts of all kinds generally support the latter, and when a decision is given in favor of a builder the advantage is rarely worth the expense. A case has just been heard in Plymouth in which a builder announced that he intended to establish a test case, and an ambition of the kind is sure to be expensive. He was summoned for erecting small houses at the rear of other houses without leaving the 15 feet of open space between the houses and the boundary wall required by the local by-laws. His defence was that he had substantially complied with the by-laws, of which the object was to secure an open space of not less than 150 square feet. But the space was obtained by an increased width, although the length was diminished by about a foot. The defendant was fined £2 and costs in each of the five cases, but what is worse, the corporation can insist on the removal of the buildings or on the infliction of an additional penalty. So far the course of the law is not favorable to the contention of the contractor, and it is doubtful if the case be brought into a higher court whether a different decision would be obtained.

LAST week, says the Builders' Reporter, a case which should serve as a warning to architects was tried at the Bristol assizes. It was another example of how little value is now attached to one's acting as well as judgment and experience dictate. The plaintiffs, Rogers & Co., Limited, who are brewers in Bristol, opened a branch on the Power Estate, in Newport, Mon. Mr. Watkins, the defendant, is an architect practising in the latter place, and he was asked to estimate the cost of a new building. It appears he returned the sum as between £600 and £700. The actual cost of the building was £1,163 17s. The plaintiffs brought their action to recover a sum equivalent to the difference between the two amounts, viz. £463 17s. The defendant said he worked out the cost at 5d. per cube foot, and it was £674. He found it ought to have been 7d., which would be about £900, and he wrote stating this. He wrote the letter at his house, and the letter produced was the original from which he wrote the letter to the plaintiffs. No mention was ever made to him as to the limit of the price. He admitted he made a mistake in the first estimate. Mr. Justice Day, who heard the case without a jury, said he was not satisfied that the defendant had informed the plaintiffs about the extent of the expenditure, and that was negligence. His lordship assessed the damages at £150. Mr. Watkins had claimed £56 commission on the amount expended, but the sum was reduced to £35. A verdict for £115, with costs, was, therefore, given for the plaintiffs. It will be observed that the defendant has been doubly punished. His commission was not determined by the amount of expenditure, and he has had to contribute a large sum towards that expenditure, as if he had bound himself that his estimate would not be exceeded. In fact, Mr. Watkins had stated that a larger amount would have to be met, but apparently the letter went wrong in the post.

OBITUARY.

We learn of the death at Chicago on August 3rd, of Mr. Thomas Watson, who in the past carried out important railroad contracts in Canada.

The death is reported at Los Angelos, California, of Mr. Edward Langley, at one time a member of the firm of Langley, Langley & Burke, architects, Toronto. Mr. Langley went to California with the object of benefitting his health.

Mr. George Pirie, a well known and highly respected contractor, died recently at Pembroke, Ont. Mr. Pirie was a member of the town council and board of education, and was held in high esteem for his reliability and enterprise as a contractor and citizen.

THE death is announced at Hamilton, Ont., of Mr. F. J. Rastrick, architect and civil engineer. Deceased was born at West Bromwich, Staffordshire, and came to Canada in 1852, locating at Brantford, but removing to Hamilton the following year. He has designed many public and private buildings, and has also been employed by the Dominion Government as inspecting architect. For a number of years he served on the council of the Ontario Association of Architects.

When using wax and oil in shading colors, it is absolutely necessary that the color should become perfectly dry before applying the varnish. It is also equally necessary that the varnish be a good elastic oil varnish, devoid of resin gums.

STUDENTS' DEPARTMENT.

"Begin at the bottom and work to the top,"
Is splendid advice to be giving,
And yet it is not the best hint we can drop
To men who dig wells for a living.

REPRODUCTION OF PLANS AND DRAWINGS.

IN Ombres et Lumiere the following process is described by A. Carteron:—A well-sized paper is selected and cut rather larger than the drawing to be copied. An ink is prepared by dissolving 8 to 10 grammes of gum arabic in 100 parts of water, and adding thereto a few drops of aniline blue or other suitable dye. The drawing is traced upon the paper with this ink and allowed to dry. The entire surface of the paper is then covered with printers' ink, by means of a roller or stiff brush, and well equalised. After a short interval the entire sheet of paper is immersed in water, and by means of a roller, or brush, passed delicately over the surface, the ink is disengaged from the traced lines. This is facilitated by the solution of the gum. The lines are thus represented by bare white paper, and the tracing may be used as a negative. If a very opaque ground is wanted, the background of printers' ink may be intensified by brushing on bronze powder with a badger's-hair brush.

DURABILITY OF DRAWING PAPER.

A CANTOR lecture by Mr. C. F. Cross shows that many modern varieties of the material that is called paper are almost fleeting. He describes a valuable set of actuaries' tables which after a year or two of office work was in such a condition that it had to be mounted with varnish, leaf by leaf, upon cloth, at a cost of £3 10s. Apparently the transactions of societies have the least chance of any printed matter of a survival, for the paper employed is selected on account of its showy appearance, which is merely superficial, and when it loses its lustre, what is printed on it vanishes. The Germans, who are giving attention to the subject, lately analysed ninety-seven standard publications from various countries. Only four were found to have less than 5 per cent. mineral stuff, and sixty-two were composed of inferior stuff and mechanical wood. It is known that drawing papers have become liable to attacks of micro-organisms. One of the causes is the employment of gelatine as a sizing agent. When the papers become moist, as happens when color is applied, bacterial life is stimulated and rapid growth follows. It is proposed as a remedy to add antiseptics to the size, but they bring disadvantages of another sort. It may be assumed that the deterioration of water-color drawings is as often produced by the use of paper containing unsafe materials as by inferior colors.

HOW INDIAN INK IS MADE.

AN interesting account of the manufacture of the so-called Indian ink, extensively used by architects, and made in the Anhui province of China, is given by Mr. Fraser, United States consul at Wuhu, on the Yang-tsze, in his last trade report. It is more correctly called China ink—encre de Chine—and from Anhui it goes to every part of China and all over the world.

The materials with which this beautiful black ink is made are sesamum or colza oil, or the oil expressed from the poisonous seeds of a tree extensively cultivated in the Yang-tsze valley, and also well-known in Japan. To this varnish and pork are added. The lampblack made by the combustion of these substances is classed according to the materials and the grade of fineness, and also according to the time taken over the process of combustion. The paste made of this lampblack has some glue added, and is beaten on wooden anvils with steel hammers. Two good hammerers can prepare in a day eighty pieces, each weighing half a pound. A certain quantity of musk of the musk-deer, or of Baroos camphor, for scenting, and gold leaves, are added to give a metallic lustre.

The materials thus prepared are molded in molds of carved wood, dried, which takes about twenty days in fine weather, and adorned with Chinese characters in gilding. About thirty-two average-sized sticks of ink go to the pound. The price varies from 50 cents or less per pound to as much as $35, there being over a dozen different grades.

CURVED AND STRAIGHT LINES.

THE great horizontal lines formed by regular layers of worked stone, as in the huge temples of Egypt, give an impression of solidity, of duration to eternity. Nothing, on the other hand, can be gayer than the pagodas of the Chinese, with their roofs curled up at the extremities—a graceful combination of curve and the oblique. This form is to be found also in the shape of their shoes and of their head-dresses, and, stranger still, in the features of their faces. Again, nothing can be more doleful than the immense roofs of the countries of snow and ice, whose sides descend nearly to the ground by two dull and rigid lines, forming an acute angle, and stretching out from the side walls as if to enclose and smother the houses which they protect. This mode of construction still prevails in northern climes. A century ago no other was employed in the villages. The houses, which were nothing but a ground floor, disappeared beneath the thick and heavy thatched roofs, the projection of which kept out the day, and gave them the appearance of being covered by an extinguisher. It is easily understood how the deliberate and clearly meant predominance of one or the other of these lines can determine, with great precision, what impression a work of art shall produce, while their skilful combination can soften or modify it to the taste of the artist. But there is as much danger in exaggeration in the one direction as in the other. If the too frequent representation of similar lines repels by its monotony, the abuse of contrasting lines ends in a neutralization of one impression by another, that is to say, in a total want of meaning.

The floating stone is one of the wonders of Corea that travellers have spoken much and often about. The stone is of great bulk and shaped like an irregular cube. To all appearance it is resting on the ground, and is perfectly free from support on any side. If two men, standing at opposite ends of it, hold each the opposite ends of a thread, they will be able to pass the thread under the stone without encountering any obstacle. The natives consider it one of the greatest wonders of their land, and have erected a temple in its honor, known as the Fon Shih Miao.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

A New Work on Plastering. A NEW work, of rather ambitious dimensions, on the art of plain and decorative plastering, has just been published in England by B. T. Batsford, 94 High Holborn, London. The book is the work of William Millar, plasterer and modeller, and is the greatest effort ever attempted in this direction. It contains over 600 pages of reading matter, each page being 8 x 11 inches, including margins, and fifty-two full-page plates. Over two hundred and thirty illustrations and explanatory diagrams are in the text, and the whole get-up is a monument of skill and industry such as the plasterer's art never before received. Every department of the art is discussed and explained from a thoroughly practical standpoint, and the rules laid down for doing all kinds of work are presented in the plainest and most unmistakable manner. The introductory chapter is interesting from an historical point of view, as it informs the reader of the methods employed by the ancients in applying plaster, and illustrates several designs in stucco found in Pompeii and in Rome, the work of artists of the first century; also designs in stucco executed in Egypt 1400 years before our era. It is with the practical part of the work, however, that we have to do here. In the matter of choosing plaster of paris for work, our author says: "The quality of plaster may be tested by simply squeezing it in the hand. If it coheres slightly, and keeps in position after the hand has been gently opened, it is good; but if it falls to pieces immediately it has been injured by damp." Of the strength of plaster he says: "The compressive resistance of properly baked plaster is about 120 lbs. to the square inch when gauged with neat water, and 160 lbs. when gauged with lime water, thus showing that lime water hardens and improves the affinity of plaster. The adherence of plaster to itself is greater than to stone or brick. The adhesion to iron is from 24 to 37 lbs. to the square inch." These are matters every worker in plaster should know.

Sawdust as a Substitute for Hair. "SAWDUST has been used as a substitute for hair, also for sand, in mortar for plastering. It makes a cheap additional aggregate for coarse stuff. Sawdust mortar stands the effects of rough weather and frost when used for external plastering. The sawdust should be used dry and put through a coarse sieve to exclude large particles. I have used it with plaster for both run and cast work; it proved useful for breaks of heavy cornices, by rendering the work strong and light for handling. Some kinds (of sawdust) require washing, otherwise they are liable to stain the plaster. Several patents have been issued for the use of sawdust in place of hair and of sand. One of these is for the use of equal parts of plaster, a lime and sawdust; another is for the use of 4½ parts each of slaked lime and sawdust to 1 part of plaster, ¼ part of glue and 1-16 part of glycerine, with a small part of hair. Kahl's patent plaster consists of 35 per cent. of sawdust, 35 per cent. of sand, 10 per cent. of plaster, 10 per cent. of glue, and 10 per cent. of 'whiting.'" The author does not tell us of the lasting qualities of mortar in which sawdust enters so largely. Older writers warn us against employing sand or lime that contains vegetable matter of any kind, because of the rapid decay of the latter. Our opinion has always been that the preserving qualities of the lime will, in almost every case, do much towards preventing the decay of vegetable or animal matter, such as may be employed as aggregates or binders in mortar, as is evidenced in the preservation of hair in the mortar of very old buildings. Our advice is, however, never to use sawdust where good sand and hair can be obtained.

Gauged Work. QUOTING again from the same authority, on the subject of gauged work, we are told that "All gauged work should be regulated in strength according to the purpose required. A brick or stone wall would not require so much plaster as a lath partition. Work not subject to friction or wear does not require so much plaster. If the work is required for immediate use, as with running screeds, or blocking out large mouldings, or fixing large castings, much plaster must be used. The amount of plaster required for scaffold work varies from ¼ to equal proportions for gauging coarse stuff or setting stuff, and from ⅓ to equal proportions for coarse stuff for heavy cornices, and ⅓ to equal proportions for putty and fixing ornament. The amount of plaster also depends upon the quality of the plaster, some of which are much stronger than others. Coarse plaster that is of a dark and sandy nature is generally weak, sets quickly, and becomes soft and useless. Fine plaster should be used for gauging putty when running cornices, also for fixing enrichments. All gauged work should be gauged with uniformity, each separate gauge having the same amount of water and plaster as required by the bulk of stuff being gauged. Unequal gauging causes hard and soft places in the work, and when more plaster is used in one gauge than another there is an extra expansion caused by the swelling of plaster, which makes the work more difficult to do when floating, setting, running mouldings, or mitring. A quart and a pint measure should always be kept on the scaffold for measuring the water used for the various gauges. The quantity of water will regulate the quantity of plaster for each

gauge. A proper plaster box should also be on the scaffold, made to hold a sack of plaster, and having a lid made in two halves hinged from the centre. This prevents the plaster from getting dirty by falling stuff, and from getting damp by absorption from the atmosphere. Where there is a large quantity, a continuous gauging, the box should be placed on a stand to prevent unnecessary exertion and loss of time by stooping for each handful. When gauging coarse stuff for large surfaces which require several gauges to complete the work in hand, size water should be used in proper proportions with the neat water used for gauging, so as to allow sufficient time to properly manipulate the material. In the event of gauged stuff setting before the work is laid and ruled off, it is difficult to make the surface strong and fair. This also allows the various gauges to be laid on or against the previous ones while they are in a soft state, thus forming stronger joints and better cohesion between the various gauges. The use of size water in gauged setting stuff and putty enables the work to be freely trowelled and finished. Gauged stuff should not be hand floated, as excessive working destroys the setting powers of the plaster." We stop here with these few quotations from the book, but it would not be doing justice to those of our readers who work in mortars and plasters if we dropped the work altogether. It contains so many good things that it is but right our readers should know more of it, and with this end in view, we will refer to it from time to time.

Average Cost of Buildings.

THERE has been much figuring and more guessing as to the cost of buildings per cubic foot. Architects and builders who have kept a strict account of the cost of their work and of the work of others, have varied so much in their figures that no sensible contractor would trust any of them. Frame buildings are put down all the way from $3\frac{1}{2}$ cents per cubic foot to 30 cents per foot, depending, of course, on the character of the building, style of finish, and whether of hard or soft wood. For brick buildings, figures have been given from 7 cents to one dollar per cubic foot, and for some public buildings even more than that. In stone work where much carving has been done the cost in some instances has run up to $1.75 per cubic foot, but in plain stone buildings it has been as low as 12 cents per foot. There never was, nor will there ever be, a constant figure that can be used in all cases of wood buildings, or of brick or stone. There are so many conditions in building that a rule to estimate by cubing correctly—can never be devised unless human intellect acquires power now not known. A quick method of cubing a building should be within the reach of every builder, which he may use in order to obtain an approximate estimate of a proposed building. Architects and builders are often asked the question: "How much would it cost to build a house so and so, with so many rooms and so and so?" and it frequently happens that on the answer to such a query the erection or not of the house depends. A rapid cubing of the proposed house would at once enable the questioned to answer with some degree of correctness; and while he can make his answer, it will be but just and fair to the questioner that he be informed that the answer given is only approximate. It should be borne in mind that frames for windows and doors cost about the same in wood, bricks or stone, the same style of finish and trimmings being used in each case. The same may be said of all other wood finish, for after the walls are up and the roof on, the difference between a stone or brick building and a frame one ends almost entirely, all things, of course, being equal. It is generally supposed, however, that the woodwork made for the interior of a brick or stone house should be more elaborate and more costly than the same class of work in a frame house. Perhaps this idea springs from the notion that a frame house is a temporary affair at best; though, as a matter of fact, a well built frame house, placed on a good solid stone foundation, will last as long as the average brick house.

How to Build a Chimney.

THERE are floating through building literature a thousand and one remedies for curing smoky chimneys, but very few methods suggested of "how to build a chimney that will not smoke." This of course is a pretty difficult task, particularly if the chimney is placed in a multi-gabled house, or near other buildings, trees, or hills. Yet fairly good results can be obtained by the scientific builder if he follows certain given rules. If a chimney is intended to carry smoke from an open fireplace it is a good plan to make the throat not less than four inches wide and sixteen inches long, which will give an area at that point of sixty-four inches—of course something will depend on the size of grate—then the flue should be abruptly enlarged so as to nearly double the area and so continue for a foot or more; then it may be tapered off gradually until the desired area is obtained. The inside of the chimney should be "parged" or plastered throughout its entire length and made as smooth as a trowel can make it, and the mortar used should be the very best so that it will harden with age. No flue should contain less area than sixty square inches. The best shape for a chimney flue is circular, or many sided, as giving less friction. Brick is the best material for the purpose, as it is a non-conductor. The higher above the roof a chimney rises the better. When expense is no object, eight-inch drain tile (glazed), built in the chimney, makes the best flue known, if properly jointed.

Hints on Estimating.

IN estimating it is always best to take the items in a certain order and to preserve that line of order throughout the whole estimate. It is impossible to exaggerate the good effects of a system which enables the contractor to know day by day how he stands. Every contractor has an interest in his competitors' knowing how to estimate correctly. It does not need many under-estimators to ruin the building business of a town. Carpenters are far too apt to imagine that all that is wanted to make a successful contractor is to be a good mechanic. This is a great mistake. The country contractor should be as good a business man as he is mechanic, and he should have a constant clear insight into his business. The business of contracting is not like that of a merchant, who is constantly selling the same articles in small quantities to the same customers at a steady profit. With a contractor each new contract is on a new basis, with a new customer, in one large amount, composed of various quantities and prices, and it is evident that it must require vastly more care and foresight to conduct his business successfully than one that is steadier. He is also entitled to a profit on the labor he employs and pays for. He should also estimate the risk of damage to the building while in course of construction. Prudence and wise precaution are not a waste of time and trouble, and if not exercised when called for, the consequences will assuredly have to be borne in loss and anxiety. Every man on the works should do his work faithfully, for the biggest leaks in contracting are often caused by workmen who shirk and shirk the work before them. It is always best to employ good men who know their business and who will do their parts faithfully. A good man is always worth his wages, no matter how much that may be.

Charge for Making Estimates.

IF there is one thing more than another that contractors should "sit on," it is the practice of making estimates for every "Tom, Dick and Harry" that fancies he is in a position to have a house built, and who expects to get a $3,000 house for eight or nine hundred dollars. The work of giving free estimates falls more on the carpenter than on any other tradesman, and there can be no valid reason adduced why he should give his time and knowledge to interested people free of cost. Advice from a lawyer or a doctor is always charged for, and justly, and the knowledge and experience of the estimator are just as valuable and require as much time and labor to acquire as does the special knowledge of the physician or lawyer. If every builder would post up in his shop or place of business a large sign with the following legend inscribed on it in large letters, and where it cannot fail of being seen by all who enter the works,

TAKE NOTICE
WE CHARGE FOR MAKING
ESTIMATES.

and if the spirit of the legend is adhered to strictly, it would be the means of a great saving of time to the contractor and would insure fair prices for work done. It is a common occurrence that proposals are advertised for extensive works "with right to reject any or all bids." There is generally no restriction as to the number of bidders, and no certainty that any bid will be accepted, in which latter case all have their trouble for their pay. This is a gross injustice on the face of it. Again, owners will solicit estimates from several builders just to learn whether it will be cheaper to build than to buy; in these cases is it not fair that the men who spend their time in preparing estimates should be paid for it? If it was generally understood that owners would be obliged to pay a percentage to each party whom they notified to give them figures, some would be content with the bids of two or three parties, either of which they would not be afraid to accept, having made their own choice as to who were the best or most responsible. As it now is, if a man has a house to build, he invites every jobber he can hear of to estimate and then makes use of an irresponsible figure to bring down the competent contractor's estimate to the same level. We do not blame the owner; the estimates cost him nothing, and he is gaining valuable information that is worth to him many a good dollar. So long as contractors are satisfied to give their estimates free of charge, so long will the owner take advantage of the generous opportunity.

The publishers of Heating and Ventilation, New York, in a card in our advertisement pages, offer to send free a specimen copy of their journal, the only one of its kind, to any address on application.

HOW TO HANDLE STONE.

ON this subject Mr. J. B. Gordon writes as follows to Stone:

There is a right way and a wrong way to open a quarry.

One should first consider the dip and rise or pitch of the strata, natural bed or rift, natural dries or seams.

A careful examination should be made by an expert to determine the right side to open.

Then decide on the kind of machinery that will be most profitable to handle the material most economically. The over-head cable system is at least one-third more economical than derricks. I speak of quarries in general. Some places derricks would be preferred.

Nine cases out of ten quarries are situated alongside railroads, or near enough to them to run switch tracks into them.

First consideration is amount of stripping; next the quantity of unmarketable stone.

Erect two cables at right angles to each other. The one along the face and above the quarry will take all the useless refuse and deposit it once and for all time out of the way. The same cable takes the stone that has to wait shipment, such as bridge ashlar, rubble, etc., to another place until wanted. The second takes the marketable stone from the first and loads it on cars direct, or alongside the track. This is handling stone by a system.

Stone-cutters can be kept at work along and under both cables without confusion or danger.

The quarry can be kept clear and clean, and every man work to advantage.

The nature of the stone rules the kind of machinery required for quarrying and cutting it.

Employ a foreman who can command men, and make him solely responsible. A quarry owner should never be a quarry "boss." He should look after the selling of the stone, and he will have all he can attend to.

A competent "boss" will see that derricks, drills, hoists, channellers, etc., are securely placed in position; that every contrivance about them is in perfect order; that no "sway," "swash" or "buckle" is permitted to go without immediate remedy; he will observe that men work steadily and clean up as well as they can alter themselves; he will insist that good men be paid a premium above the ruling wage-scale in common, thus insuring faithful service and strict obedience.

Now, a word or two to masonry contractors: In building large walls loss is often suffered because the work is intrusted to foremen who lay out the work, stretch the lines and hoist the stone, but who let the mason select the position for it, thus delaying the work of the derrick until mason decides the bed and where to place the stone. This takes much time, but as the work seems to be going on all right the loss of time is not noted. Now the foreman should lay out the work, see that everything is in ship-shape; select each stone for the place he has designated in the wall before moving it, mark the bed, and let the masons do the work. He has done the thinking.

The use of broken ashlar is increasing every day. It has been considered expensive to construct. It isn't, if it is made right. Usually on buildings where there is considerable of this work, you will likely find on the wall six men doing work that two competent masons ought to do. The stone is sent to the scaffold in all sizes, or as the masons call for it. In consequence they spend half their time measuring. Now, if the fitter or stone cutter were properly instructed as to the bond, he could send the stone to the wall, where, as I say, two men could do as much work as a half-dozen in the usual way. I have done it.

ARTIFICIAL STONE AND MARBLE COMPOUNDS FOR BUILDERS.

THE following formulæ, writes "W. C. S.," in the Building News, give the methods of preparing some of the best-known products used as artificial stones, concretes, etc., which are open for anyone to prepare :

ARTIFICIAL STONE COMPOUNDS FOR BUILDING.

No. 1.—Ingredients: 10 parts of hydraulic lime which has fallen to a powder, with water to form a paste ; 25 parts of gravel, 5 parts of coal ashes or wood ashes, water q.s. Preparation. Thoroughly mix the mass, and add sufficient water to make the mass equal to 50 parts bulk, then pour the mass into moulds made of wooden boards and allow it to set.

No. 2.—Ingredients : 125 parts of hydraulic lime which has fallen to a powder, mix with sufficient water to form a paste ; then add 250 parts of ground oyster-shells and 150 parts of ground peat ashes, and sufficient water to make the whole equal to 500 parts in bulk. Then pour into mould until set, as in No. 1.

No. 3.—Ingredients : 100 parts ground quartz sand, 2 to 10 parts finely-ground plumbic oxide, water-glass (silicate of soda) q.s. Mix the solids together, and then moisten with the water-glass until thoroughly mixed, and firmly press into moulds. When set, the stone mass thus formed should be burned.

No. 4.—Ingredients : 1 part of cement (Portland), 3 parts of sand, dilute sulphuric acid (1 part acid to 50 parts water). Preparation : Mix the sand and cement into a dough with the acid fluid, and submit to a strong pressure. Then dry the stones in the air for two days, and afterwards steep them for 12 hours in water and acid (3 of acid and 100 of water), and finally dry them.

No. 5.—Ingredients : 2 parts of Portland cement, 1 part of sand, 1 part of cinders, solution of green copperas q.s. Preparation : Dissolve the green copperas in water until no more will dissolve. Separately mix the three solids together in the dry state, and then moisten them with the solution of copperas ; press the mass into moulds, and allow them to dry in a warm place for two weeks ; then take the blocks out of the moulds, steep them in water for 24 hours, and finally dry for four weeks.

No. 6.—Ingredients : 10 parts unslaked lime, 3 to 4 parts of water, 40 to 60 parts of dry sand, 2½ to 10 parts of hydraulic cement. Preparation : Mix the lime with the 3 or 4 parts of water, and then mix in the sand, and finally the cement. Afterwards grind the compound, and press into moulds.

No. 7.—Ingredients : One part of alum, 15 parts of water, 2 parts hydraulic lime, 10 parts sand, one part cement. Preparation : Dissolve the alum well, and then add the other ingredients, and work up to the required consistency ; press into moulds, and allow to remain for 24 hours. The blocks of stone thus prepared will not be fit for use for at least 14 days ; but to be thoroughly hard requires longer drying.

No. 8.—Ingredients : 30 parts of quartz sand, 1 part of oxide of lead (plumbic oxide), 10 parts of water-glass. Preparation : Mix the sand with the oxide, and then make a dough of the mass by adding the water-glass ; press into moulds, and then heat the blocks at a red heat for two hours.

No. 9.—Ingredients : 4 parts of coarse sand, 1 part of cement, gravel q.s., lime-water q.s., 2 parts of fine sand, 1 part of cement, 1 part of dry metallic coloring matter. Preparation : Mix the sand, cement and gravel with sufficient lime-water to form a paste ; press this into moulds, and cover the surface with a composition made up of the fine sand, cement and coloring matter. When the surface is nearly dry, brush it over with a solution of water-glass.

No. 10.—"Victoria" stone is made as follows : The refuse from the granite quarries is broken up into pieces of suitable size, and 4 parts of the fragments thus obtained are mixed with one of Portland cement, with the addition of sufficient water to bring the mass to the consistency of dough. The mass is run into moulds, in which it is allowed to remain for several days, or until it has set solid ; the blocks are then immersed in a solution of silicate of soda.

No. 11.—Ingredients : 400 parts of sand, 52 parts of limestone, 6 parts of burnt clay (brickdust), 13 to 25 parts of water-glass. Mix all together.

ARTIFICIAL MARBLE.

No. 1.—Ingredients : 8 parts marble-dust or white limestone, 2 parts zinc oxide, 1 part Portland cement, hot acqueous solution of water-glass q.s. Mix the three solid ingredients into a paste with the solution of water-glass (which should contain about 40 per cent. of the glass), and mould the paste under pressure while warm, and expose the moulded form for a week or ten days to warm, dry air before finishing.

No. 2.—Ingredients : 280 parts of granite or other stone, broken small ; 140 parts of limestone or chalk, 5 parts of burned calamine, 3 parts of calcined feldspar, 2 parts of calcium phosphate, 40 parts of water-glass. Mix all the ingredients together in a dry state before adding the water-glass, then press the paste into moulds, and dry the finished pieces at a temperature gradually rising to 125° Fahr.

No. 3.—Ingredients : Alum, water, plaster of Paris. Preparation : Dissolve alum in water (cold) until no more alum will dissolve, and then gradually stir in dry plaster of Paris until the mixture is of a suitable consistence, then spread out the plaster in slabs or form into blocks and bake it.

VARIEGATED MARBLE

is produced artificially by mixing dry Portland cement with dry pigment that will color the cement, and the mixture is made into a paste with the least possible quantity of water. Make a separate pasty compound of each color, and then place each separate compound one on top of the other, and press the compound from all sides, and beat it, so that the colors of the different parts impress themselves on each other without any uniformity; the result will be the production of veins penetrating the mass, which should then be sawn into plates or slabs, and these pressed in a mould for twelve days, during which time they should be kept moist as long as they are not entirely hardened. The polishing of each slab is proceeded with just like marble is polished.

IMITATION MARBLE

may also be produced from sandstone by impregnating the latter first with a solution of sulphate of alumina, and the next one of water-glass. The sandstone will thus acquire a marble-like appearance, and can be polished. The sandstone when thus prepared can be submitted to a very great heat, until it is almost vitrified. It is likewise unaffected by atmospheric influences.

CONCRETES

for floors and pavements can be prepared thus : Remove the soil to a depth of two feet, and then lay in the largest stone or rubble you can obtain to the depth of one foot, and on top of this shoot sufficient small stones—about the size of eggs—to fill up the interstices, and level the surface smooth. On top of this put a layer of coarse gravel six inches thick, and well douse the whole with water, and let it remain some days until it has well settled. The stuff so laid in will form a solid body or foundation for the concrete, which should be prepared as follows : Mix one barrel of good cement with 3 pounds of clean sharp sand ; well mix together in the dry state, and then make the mixture into a paste by sprinkling sufficient water on it, well stirring the whole. To the compound thus mixed add two barrels of stone chips and two barrels of coarse gravel, but only as much as the paste will readily combine with. Mix all thoroughly, and then tip it on the bed or foundation, and level it off to its proper height. Proceed with the laying of this deposit as quickly as possible, and when the whole surface is covered, ram it down by the aid of a rammer, such as is used by paviors. Finish off the surface by laying on a thin layer of pure cement mortar to bring the surface to complete evenness. Do not let it dry too quickly, but wet it occasionally so that it shall have all the water it will absorb.

CONCRETE MARBLE.

No. 1.—Ingredients : Milk of lime (prepared by steeping lime in water, allowing it to settle, and pouring off the fluid, which is the "milk of lime" required), finely-powdered marble or limestone, or else chalk ; a small quantity of coarsely-powdered limestone. Preparation : Mix the marble, limestone, or chalk with the milk of lime until it acquires the consistency of paste, and to give the whole more cohesion add the coarsely-powdered limestone. Lay the compound as quickly as possible, as it dries very quickly, and becomes hard.

No 2.—Five parts coarse sand, 12 parts pebbles, 3 parts lime.

No. 3.—Sixteen parts pebbles, 8 parts river sand, 2 parts lime. Mix with water to a suitable consistency.

SPECIAL MORTARS.

HYDRAULIC MORTAR.—Burn some lime (CaO, calcic oxide), and then moisten the burnt lime with water and allow it to fall into a powdery condition by exposing it to the air ; this powder will be calcic hydrate (C_aOH_2O i.e., slaked lime). Separately prepare some kisselguhr (infusorial earth or fossil meal), by washing, drying, gently heating, and pounding up any lumps that may be formed ; then mix this fossil meal with the calcic hydrate in equal weights, and mix the compound with water to form a suitable working consistence. For mortars that are not much exposed to water, mix 1 part of infusorial earth with two parts of calcic hydrate (by weight). Another good hydraulic mortar may be made by mixing 1 part of alum shale with two or three parts of the slaked lime. The mixture is moistened with water for use, and used as mortar. It dries very quickly, becomes hard and impermeable.

A mortar for damp places may be made by using a warm solution of green vitriol (sulphate of iron or ferrous sulphate, as it is also called), with which to slake the lime, and mixing the slaked lime with very fine quartz sand.

To make ordinary mortar harden under water, add a little manganese to it.

Turkish mortar, for use in building solidly-constructed edifices, is prepared by mixing with water to the desired consistency 1 part of powdered brick and 2 parts of sifted lime. Put this on in layers of 5 in. or 6 in. thick between the course of brick and stone.

RULES FOR MEASUREMENT.

Many states have different rules of measuring for various portions of buildings, and we give below a few rules which are in general practice throughout many of the states, says the National Builder :

STONE WORK.

Measure rubble work by the cubic foot or by the cord of one hundred cubic feet.

Measure the outside of walls for their length, exclusive of pilasters.

At re-entrant angles measure through the walls both ways.

The section of a pilaster shall be measured as the sum of its face and returns multiplied by twice its projection from the face of the wall.

Measure openings over four feet in width as though four feet were unbroken.

Measure openings of greater width than five feet as five feet narrower than their actual size and deduct the balance.

Independent piers shall be measured at their actual cubic contents, and paid for according to the character of the work.

Footing courses shall be measured by same rules as walls.

Ashlar work, range work, copings, etc., are to be measured superficially after measuring the walls as rubble. Openings shall be deducted with the exception of reveals.

BRICK WORK.

Masons' measure shall be reckoned at 7½ brick per foot super for each half brick of thickness of wall.

To get the lengths of walls measure the outside exclusive of pilaster.

At re-entrant angles measure the thickness of the wall one way, thus giving the actual material.

The section of a pilaster shall be measured as the sum of its face and returns multiplied by its projection from the wall.

Measure all openings of ten square feet or less as though they were unbroken.

Measure openings over four feet in width as though four feet narrower than their actual size, and deduct the balance.

Independent piers shall be measured at twice their actual contents, and paid for according to the character of the work.

Hollow walls : Allow the mason one-half the air space.

We also give the rules for measuring roofs of different materials :

SLATE AND TILE ROOFS.

Measure by the square of 100 feet.

Measure the slope at one foot longer than the actual length covered.

Measure only to the edge of slates on gable, and measure one foot more than is actually covered on each side of hips and valleys.

The horizontal measure of a conicle or other curved roof shall be made at its base.

Measure openings of ten square feet or less as though the roof were entire.

Measure larger openings as though two feet narrower each way than the actual openings and deduct all but this allowance.

Valleys, flashings, etc., to be measured at the actual surface of metal used.

METAL ROOFS.

Measure the actual surface of metal used, including flashings.

Measure all openings of ten square feet or less as though the roof were entire.

Measure all openings of more than ten square feet as though one foot narrower each way than the actual opening and deduct all but this allowance.

PITCH AND GRAVEL ROOFS.

Measure the actual surface covered.

Measure all openings of one "square" (100 square feet) or less as though the roof were entire, and all openings of more than one "square" as though one foot smaller each way than the actual size, and deduct the openings thus measured.

Deduct nothing for fire walls in the roof.

Allow the actual metal used in flashings.

ELECTRICITY IN BUILDING OPERATIONS.

FROM the Electrical World we learn that temporary electric lighting installations have proven to be an almost indispensable aid during the contruction of the modern many-storied buildings. With such artificial illumination, work is carried on throughout the entire 24 hours with many resulting economies. It is interesting to note that in almost every case when current can be obtained from the street electric supply service, or sometimes from adjacent isolated plants, both arc and incandescent lights, and in some cases electric motors, are temporarily used. As the building progresses temporary wiring is extended from floor to floor, and in some cases supplies quite a large number of lights.

A number of New York "sky scrapers" now in course of construction are wired for from 50 to 100 arc lamps and 200 to 300 incandescents. In one of these buildings a pipe cutter and a drill press are being operated by electric motors, and in another several electric tile polishing machines are in use. Other applications will readily suggest themselves. Originally the wiring is usually in fairly good condition, but as the work on the building progresses, constant overhauling and changing is necessary. One or more men are continually employed in watching the work and making the alterations in the location of the lights.

In the present temporary installations of this nature ordinary single and twin rubber insulated conductors are used, supported on porcelain insulators fastened to the iron or brick work. In some cases lead-armored conductors are used without insulators. It would seem advisable to adopt some special conductors and fittings for this work. There also seems to be an excellent field here for compact, portable electric generating plants, consisting of vertical boiler, high-speed engine, and direct-connected dynamo, mounted on a single bed-plate or separately. The use of such portable plants would cetainly be productive of particularly economical results. A compact gas engine and dynamo combination on the same lines might also be suggested if the necessary continuous running could be guaranteed.

Aside from the importance of proper illumination and power appliances, the necessity for frequent intercommunication between distant parts of these 15 to 25 storey buildings, would seem to warrant the installation of a temporary telephone system with stations perhaps upon each floor. The temporary installation of such systems is to be expected in future large buildings during construction.

THE TECHNICAL TRADE JOURNAL AS AN EDUCATOR.

THE value of a well-conducted trade journal to a man who is engaged in the industry represented by that publication cannot be over-rated, writes Mr. Thos. P. Pemberton in the Master Steam Fitter. Nearly all trade papers, as the term is understood, are more or less technical in character, giving information not only of the general condition of special industries, but also of the changes and improvements made by manufacturers in design, process and construction. When these can be presented to readers by means of outline drawings and finished engravings the usefulness of the trade paper is still further increased. The daily newspapers pay little attention to the multitudinous details which are of interest to manufacturers. They may announce new inventions, the erection of large works, peculiarities in mechanism and operation, or great scientific discoveries, and these, undoubtedly, interest general readers and satisfy the public mind in its eagarness to know, at least, something of all current developments and events. But when the manufacturer desires minute information regarding his own special industry, he has recourse to technical and trade journals, which give him information of what others are doing and how they are doing it. The industrial press, when it performs its functions properly, does precisely that which the daily press leaves undone. In saying this we do not forget the wonderful enterprise of some of our large American dailies in giving illustrated descriptions of many new inventions and discoveries, but these, however satisfactory for general readers, are incomplete for manufacturers who may be particularly interested in all the details of design, construction and operation.

But how is the technical trade paper an educator? Its mission and purpose are, in its successive issues, to cover the whole ground and to confine its information to the particular field in which it operates. It reports and explains many new processes, whether they be developed at home or abroad; it illustrates and describes important new machines and apparatus; it records the progress of invention and improvement in different branches of industrial art and applied science; it announces what is being made and sold; the organization of new firms; the award of contracts; the construction and operation of large plants; and gives special information on special subjects for manufacturers of specific articles. All this and much more is in the routine and absolute requirements of business education.

The advertising pages in such a journal are not a mere dreary and uninviting series of puffs and boastings. They are an illustrated catalogue and chronicle of the supplies which are required in particular branches of industry. They indicate the most advanced state of ingenuity; they present to the eye and the mind qualities and forms; they tempt the manufacturer and the consumer, as a matter of self interest, to examine them. Those who do not examine them exclude themselves from information for which, if they comprehended their own interests, they would be willing to pay handsomely.

Trade journalism in this country has acquired dignity and importance; and in this field, as in all others, popularity, success and rapid growth are the portion of journals which prove their possession of brains, enterprise and sincere devotion to the interests of which they are representatives. They are educating mediums for the advancement of civilization, the progress of commercial enterprise, manufacturing industry and mechanical ingenuity. They are the exponents of taste, design and utility, and an inestimable benefit to producers and consumers, to both employer and the employed.

IRON CANTILEVER ROOF.

THE cantilever principle has been successfully applied by Mr. C. Doucas in the designing of the roof of the machinery hall of the Geneva Exhibition. The cantilevers rest on columns 124 ft. 8 in. apart and 47 ft. 5 in. high; they are anchored down to standards 35 ft. 6 in. high at the side walls, which are 288 ft. 8½ in. apart. At the centre, between the free ends of the cantilevers, is a space of 25 ft. 3 in. spanned by a ventilator roof. The standards, being designed to resist the whole of the wind-pressure, have a base of 5 ft. 7 in., and are anchored on to blocks of concrete. The length of the building, 490 ft. 6 in., is divided into nine intermediate bays of 47 ft. 7 in., and two end bays of 31 ft. 2 in. The cantilever principals enclosing the end bays meet in an expansion-joint in the centre, the ventilator only extending over the inner nine bays. In this part there are ten latticed purlins. The intermediate rafters supported by the purlins are 15 ft. 10 in. apart and 3 ft. 3 in. deep, and carry intermediate H-bar purlins. There is no wind-bracing except in the two end bays.

The main bracing in the principals, purlins and intermediate rafters is arranged in single triangulation, and generally consists either of two angle bars riveted together, or of single angle bars, the length of these members varying from 4 ft. to 10 ft. Columns and standards are also made of single triangulation lattice-work. The lightness of the structure is remarkable.

Before carrying out the design, the committee of the Exhibition submitted it to the criticism of Professor Ritter, of Zurich, who approved of it, and recommended the following factors for the calculation of strength:—Snow load, 6·14 lb. per superficial foot; wind-pressure, 16·38 lb. per superficial foot; tension or compression on wrought iron, seven tons per square inch. The total weight of wrought iron is about 500 tons—i.e., 7·78 lb. per superficial foot, or 0·135 lb. per cubic foot inclosed. The iron structure, after having served its purpose, became the property of the contractors.

Mr. D. Stevens, of Chesley, Ont., is rapidly pushing to completion the new Public School building in that town, for which he was given the contract.

QUESTIONS AND ANSWERS.

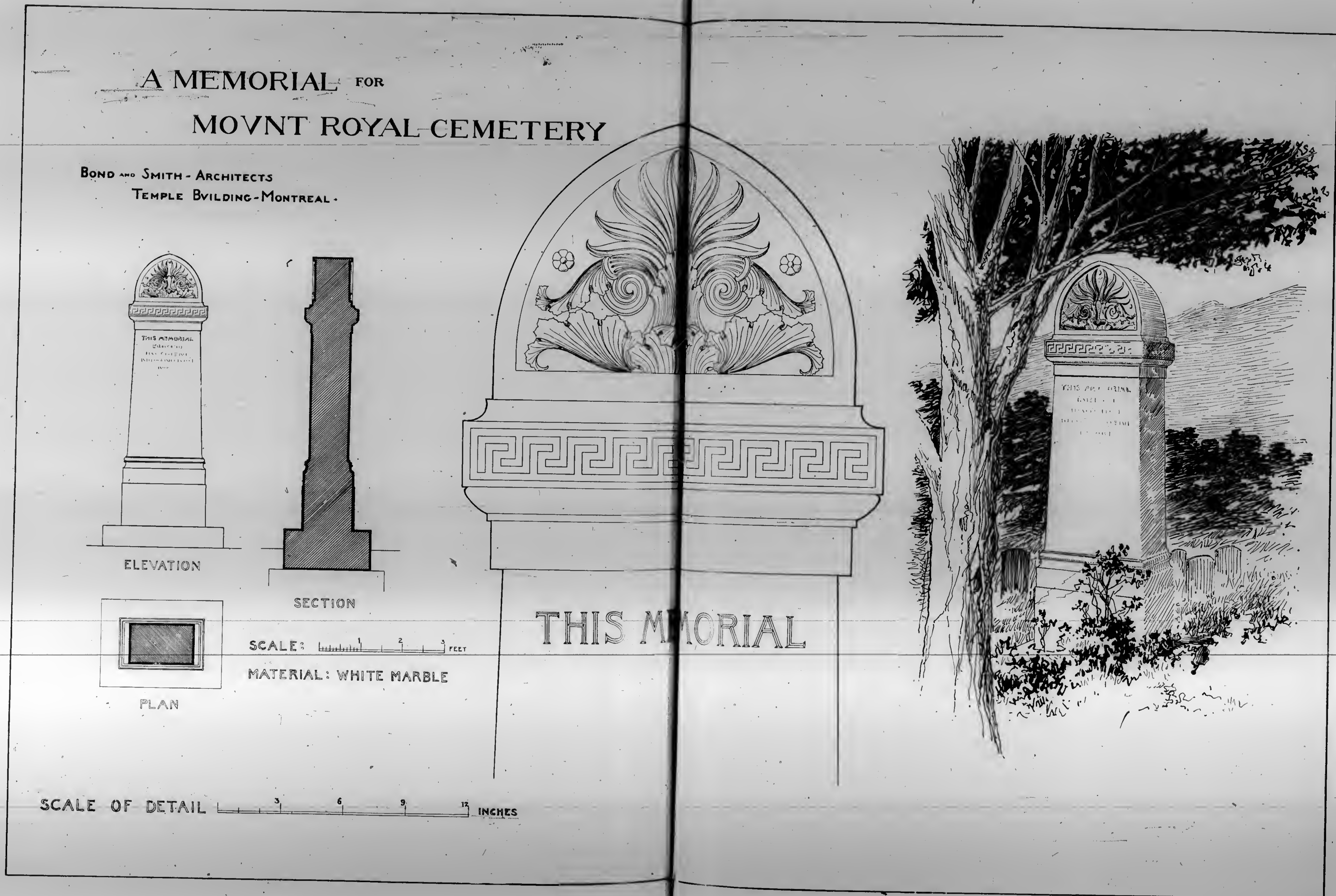
A SUBSCRIBER at Galt writes: Could you let me know how to make a good red stain for brick. I want to color a building of white common brick. If you can give me a recipe that is known to have given good results, I shall feel obliged.

ANSWER.—Slake one-half bushel of lime in a tight barrel by pouring over it sufficient boiling water to cover it four or five inches deep, stirring it until slaked. Then fill the barrel two-thirds full of water and add a bushel of best Owen Sound Portland cement. To this add 3 lbs. sulphate of zinc, previously dissolved in water. Color with Indian red to suit. If this is too dark use Venetian red. A clean coal oil barrel will answer. If a pailful of clean fine sand is mixed with these materials and kept well afloat while using, the work will be much improved. Apply with a flat brush. Be careful not to splash stone or woodwork, for when dry it is next to impossible to remove. This mixture, when properly applied, renders the brickwork impervious to damp.

A new window frame carries a rod at one side on which the window is hung to swing outward as well as slide up and down.

In painting brickwork it is of great importance to see that the bricks are thoroughly dry, and they should, therefore, not be touched after a storm or heavy rain. The best time to paint this class of work is in a hot summer. These remarks apply equally to stonework.

PREPARING ZINC FOR PAINTING.—Dissolve in 64 parts of water 1 part each of chloride of copper, nitrate of copper and sal ammoniac; then add 1 part of commercial hydrochloric acid. Brush the zinc over with this mixture, which gives a deep black. Leave it to dry for twenty-four hours, when any oil color will firmly adhere to it, and withstand both heat and damp.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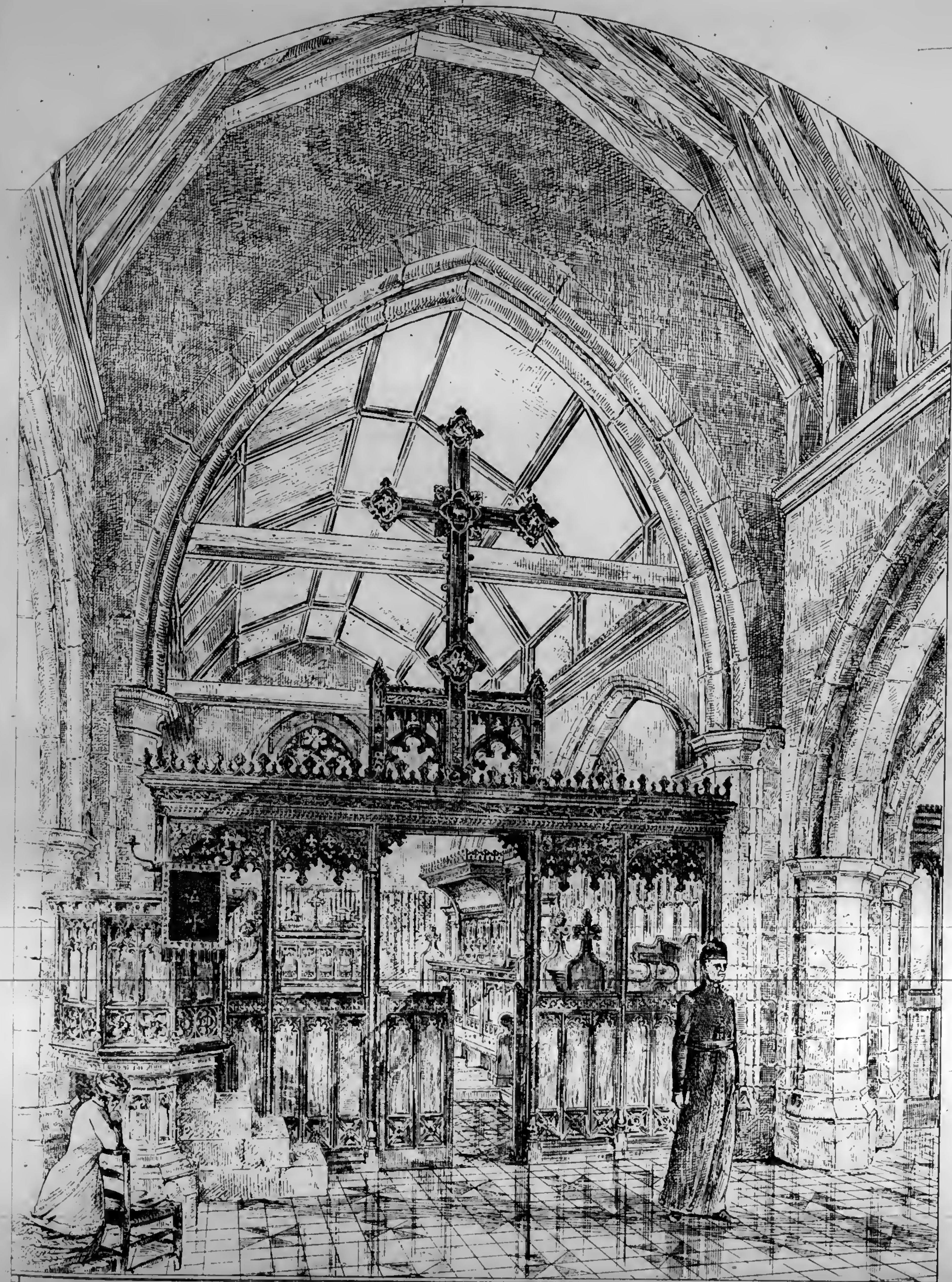

St Nicholas Church Rodmersham Kent

Restored by H. Slingsby Stallwood : Architect.

Drawn by J King James 1 St James Rd Handsworth Birmingham

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—THE—

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Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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Statues for Parliament Hill. ARTISTS are being invited by the Secretary of State to submit designs and models for statues of Her Majesty the Queen and the late Hon. Alexander Mackenzie. The statues are to be placed within the Parliament grounds at Ottawa; that of the Queen is to be located on the terrace directly in front of the buildings. The location of the other statue has not yet been chosen. This should have been one of the preliminary steps in the undertaking, so that designs might have been adapted to the surroundings. The sum of $5,000 has been appropriated for each statue, an amount altogether inadequate for the purpose. Twenty thousand dollars would be a sufficiently moderate figure for a statue of the Queen to occupy such a conspicuous position. It is gratifying to note that the competition is restricted to Canadian artists. It is to be hoped that the preference thus given to native talent will not be offset by the expenditure being limited to a figure which will not allow the competitors scope for their abilities.

The London Hospital Competition. ARCHITECTS who may not wish to have their trouble for their pains would do well to look carefully into the conditions before entering the competition for plans for the proposed hospital building at London, Ont. In the printed instructions to architects, the committee in charge state that the competition will be decided by an expert appointed by the Ontario Association of Architects. On inquiry we learn that the O.A.A. have never been consulted with regard to the matter, consequently the statement referred to is totally unauthorized. We presume the Association will call the promoters of the competition to account for this unwarranted use of its name. In addition to this there are other peculiar features of the competition. Architects were originally given to understand that while the committee did not desire to pay an architect's fees for superintendence, they were prepared to pay the usual fees for preparation of drawings. At a later stage, however, the announcement was made that a lump sum of $500 would be paid to the winner of the competition for his drawings. This sum is less than one and one-half per cent. of the estimated cost of the buildings. The whole affair has the appearance of being arranged to admit of the work being given to some favorite architect, who, in conjunction with the committee, would at small cost reap the advantage of the ideas evolved by all the competitors.

The Renaissance of Wro't Metal.

THE return to favor of wrought metal work, after a lengthened period of decadence is a noteworthy feature of the architectural development of the present day. It is also a subject for congratulation, indicating in some measure an improvement in public taste. The manufacture of architectural wrought metal work, which a few years ago bade fair to become one of the lost arts, has kindled into vigorous life again, and is become an important industry. The favor recently bestowed by architects and others on this material has brought to the front men with ability to meet the highest requirements. It is gratifying to observe that we have in this line of manufacture in Canada ability of a high order, and work is being produced here which will favorably compare with the best foreign product. It is likewise satisfactory to learn that most of the leading Canadian architects now specify entirely Canadian material, although a few cling to a prejudice in favor of the foreign made article. We understand that the new court house building in Toronto will contain some excellent examples of Canadian skill in design and manufacture of wrought iron and bronze work. The appearance of most of the new buildings under construction is enhanced by the use of this class of material while the substitution of well-designed wrought iron fencing for wood and cast iron has greatly increased the attractiveness of the residential streets of many of our cities.

Qualifications of Firemen.

THE important changes which have taken place in recent years in materials for building, as well as in methods of construction, have rendered necessary the possession by firemen, and especially by chiefs and superintendents of fire brigades, of a wider range of knowledge than was formerly considered necessary. When, for example, the electric elevator in a New York building of over twenty stories, fell recently, killing the engineer and elevator boy, causing a water main in the basement to burst, and flooding the basement, there was no one at hand to stop the electric machinery, and the firemen were called out for the purpose. Fortunately they knew what to do, and their knowledge promptly applied, was doubtless the means of preventing a worse catastrophe. It is pertinent to ask how many firemen possess knowledge of this character, for which ten years ago there was no demand? In connection with the recent fires in Toronto, the suggestion was made that the firemen should spend some of their leisure time in making themselves familiar with the interiors of the principal buildings in the business district of the city. The proposal is one which, if acted upon, would aid in preventing the destruction of property and life. Candidates for the position of assistant superintendent of the Dublin fire brigade, were compelled to submit to a competitive examination to test their knowledge of building construction. The following is a sample of the twenty questions which they were called upon to answer: "If 29 cubic feet of brickwork weigh a ton, what weight will the supports of a shop front have to carry, exclusive of weight of roof, floors, and contents, the wall being 18 feet in length, 36 feet high and 18 inches thick; making no allowance for window openings?" We have not observed anything which would indicate that firemen in Canadian cities are instructed in subjects such as these, upon a knowledge of which their own safety and efficiency and the safety of others may in some cases depend.

Rights of Architects in Competitions.

IT is gratifying to learn that a test case is to be brought in the United States Courts to determine the legal rights of architects in competitions in which the conditions have been violated. This test case is brought against the commission controlling the competition for a State Capitol building at Harrisburg, Pa. Eight architects were invited to enter the competition, with the understanding that one of their number, whose design should be recommended by the expert advisers to the commission, would be entrusted with the work. The commission, actuated, it is supposed, by political considerations, refused to act on the recommendation of their experts, rejected all the designs, and announced a second competition. On this ground an injunction has been applied for on behalf of the competitors "to restrain the commission from acting, and to compel them to perform the provisions of the programme for the selection of an architect, author of one of the eight designs reported to them by the Board of Experts under the provisions of the programme, and such other and further relief as may be proper in the provisions." The result of this action will be looked for with interest by architects everywhere who may at one time or another have suffered injustice at the hands of persons controlling architectural competitions. We trust a check will be put on the practices of those who under false pretensions seek to obtain gratis the benefit of architectural ideas which by right should be paid for.

The P. Q. A. A.

A PERUSAL of the proceedings of the recent annual meeting of the Province of Quebec Association of Architects, printed in this number, will show that the organization has not been inactive during the year. The Association has been working in a quiet manner for the furtherance of the interests of Architecture, and is making its influence felt in several directions. To those acquainted with the discouragements under which it has had to labor, the quiet determination with which the leading spirits in the organization put forth effort in behalf of the well-being of the profession, is extremely admirable. It is by the unwearying efforts of such men that reforms are accomplished, and we have no doubt that in years to come the importance of the work which this Association is now doing will be abundantly manifest. The improvement of local building laws, the securing of needed amendments to its charter, the appointment of Municipal Art Committees, and the formation of a Dominion Institute of Architects, are some of the important subjects which the Association has had under consideration during the year. While it is matter of regret that none of these objects have so far been achieved, advancement has been made with regard to most of them, and in the case of some there is reason to anticipate final success. Mr. Peachy, the new president, is a gentleman of recognized ability, and being resident at the seat of the local government of the province, will be in a position to help forward the changes which the legislature at its next session will be petitioned to make to the statutes bearing on the practice of architecture.

Trade Commissions to Architects.

OUR attention has quite frequently been called to the fact that some architects in Canada expect and in some instances attempt to exact a commission from manufacturers and dealers whose materials they are asked to specify or purchase. Complaints have come to us regarding this matter from so many different sources, accompanied in some instances by names and full particulars of the transactions, that we are reluctantly forced to the conclusion that they cannot be unfounded. A Toronto manufacturer states that he recently received an order for certain goods from a well-known architect in an Eastern city, with accompanying letter, which read: "I understand you are accustomed to allow a percentage to the trade off your catalogue prices. I want you to credit this percentage to me." Such practices on the part of an architect are undignified and dishonest. They are unfair to the client, who employs the architect to impartially select for him the best goods, and also to the manufacturer or dealer who is desirous of doing business in an honorable way by selling his goods on their merits. The architect who accepts a favor of any kind from a manufacturer or dealer at once places himself under obligation to give favors in return, which favors usually come out of the pockets of his clients. On the other hand, the manufacturer and dealer are liable to press the advantage they have acquired to such a degree that by and by the architect feels himself bound to resent their implied ownership of him by specifying somebody else's goods. There is fortunately a brighter side to this picture. We have been told of instances in which goods sent as presents have been promptly returned, accompanied by a message more forcible than polite, and the person offering the bribe thenceforth occupied a conspicuous place on the architect's black list. For architects of this character the public, the manufacturer and the dealer have the highest respect, while those who ask and accept favors must often feel their ears tingle as the result of the opinions freely expressed behind their backs.

BY THE WAY.

BUILDING Inspectors, like other public officials, come in for a fair share of criticism for their alleged sins of omission and commission. Some of the criticism is well deserved; some of it is not. But what man with a spark of humanity in him could find it in his heart to find fault with the Building Inspector of Denver, Colorado, whose duties are thus defined: "The commissioner of inspection shall have charge of the inspection of buildings and parts of buildings, drains, drain laying, elevators, boilers, gas and electric fittings, gas and electric lights and all other apparatus and machinery requiring inspection and regulation, as the same may be authorized by ordinances; the inspection and control of electric wires, the inspection of weights and measures, the smoke nuisance, the erection and care of work houses, charities and corrections, and the care of markets and public baths."

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To know the actual cost of various classes of completed work is a help to the architect and builder in approximately estimating what work of a similar character should cost. For this reason the following calculations recently published in an American review, based on returns from the City Building Department, as to the cost of various classes of building in New York, should have an interest for readers of this journal: Frame dwellings, of the cheap two-story class, average in cost \$3.71 per square foot of ground covered, or \$1.85 per square foot of floor space. Brick dwellings of three storeys average \$3.65 per square foot of floor, counting nothing for the cellar; five-storey houses cost exactly the same, and four-storey ones, averaging the few examples found, cost a trifle less. Flats of five or six storeys average only \$2.03 per square foot of floor; flats with stores underneath cost \$2.83; "stores and lofts," that is, ordinary mercantile buildings, give \$3.12 per square foot of floor, where the building is not over six storeys high. A six-storey hotel cost \$3.33 per square foot of floor, and a twelve-storey warehouse a little less than \$3. Office buildings of the "sky-scraper" sort are much more expensive, one of nineteen storeys costing \$116.82, and one of twenty-one storeys \$123.34 per square foot of ground covered, or \$6.14 and \$5.37 respectively per square foot of floor-space. Of course, prices for material and labor are considerably higher in New York than in any part of Canada. It is this difference in prices as between one locality and another that renders it exceedingly difficult to estimate the probable cost of work in one locality by the cost of completed work of a similar kind elsewhere.

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CANADIANS will be interested to learn that the Princess Louise, whose skill as an amateur painter and sculptor is well known, has recently turned her attention to architecture. Workmen are at present engaged in completing a building designed by the Princess (with the assistance of a young London architect) and erected on the Argyll ducal estate in Scotland. The plans designed by Her Royal Highness were for an extension of the little hostelry at Roseneath, a sylvan shaded resort most charmingly situated on the western bank of one of the long blue lochs that open off the Firth of Clyde. Roseneath is one of the quietest retreats on the Clyde. Few trippers profane its walks, and house-letting accommodation is limited in the extreme. On this account the Marchioness and Marquis of Lorne have for some past found in Roseneath a delightfully quiet recruiting-ground at the close of the London season, and the little inn has been their home. The enlargement designed by the Marchioness is being carried out to provide a wing for the distinguished couple when they visit the district. The wing will include some half a dozen bed rooms, public rooms, a spacious hall and offices, and the plans have been drawn up with an architectural success so great that the work may in coming years be looked back upon as the pioneer design in the opening up of a new field for the ever-widening work of womankind. The drawingroom is a handsome apartment; and its large windows face the picturesque waters of the Gorelock and Ben Lamond while a spy window has been inserted, no doubt for the purpose of commanding a pretty peep of the western sunsets and the Argyll hills. There is also an alcoved fireplace with arched stone mantelpiece. In the dining-room the windows have Mediæval arches and iron mullions, with casement and small panes. A gun-room has been provided, and, as becometh a lady architect, the kitchen is a poem in red tiles. Internally pretty in design, externally the building is straggling and far

from pretty. It has many quaint features, however, in the form of knobbed rhones, spouts instead of rain-conductors, and basket windows. The design is royal and also unique, and the inn when finished will be by no means a conventional one. So close is the interest taken in the work connected with the rearranged hostelry by Her Royal Highness that she intends herself to paint the device on the sign that is to hang in old-time fashion over the doorway of the public entrance to the building, and the walls of the new apartments are to be artistically decorated according to her own scheme of treatment.

ILLUSTRATIONS.

ERRATA.—In the September number of the ARCHITECT AND BUILDER the name of Mr. "David" Maxwell was given as the architect of the Bell Telephone Company's building. It should have read "Edward" Maxwell.

DESIGN FOR PROPOSED CITY HALL AT ST. THOMAS, ONT.—EVAN T. MACDONALD, ARCHITECT.

RESIDENCE FOR MR. H. W. FORD, ST. THOMAS, ONT.—EVAN T. MACDONALD, ARCHITECT.

INTERIOR VIEWS IN THE RESIDENCE OF MR. M. J. HANEY, ROSEDALE, TORONTO.—ERNEST R. ROLPH, ARCHITECT.

The two interior views of Mr. M. J. Haney's house in Rosedale, Toronto, published in this issue, should prove interesting, as showing the success with which an old house could be remodelled.

The alterations, which are somewhat extensive, were done under the general superintendence of Mr. Wm. Clarke, in accordance with the designs of Ernest R. Rolph, architect. All interior decorations were executed by Wm. H. Elliott & Co., of this city.

THE HOLY BLOSSOM SYNAGOGUE, BOND STREET, TORONTO.—J. W. SIDDALL, ARCHITECT.

The building, which is an adaptation of the Moorish style of architecture, is constructed of Ohio sandstone, plain and pressed brick. The most important feature of the Bond street facade, shown in the illustration, is an 18 foot semi-circular arch, highly ornamented with terra cotta. In the tympanum of this arch are bands of stone containing the words in English and Hebrew, "The Holy Blossom Synagogue," "Hear, O, Israel, the Lord our God the Lord is one," in gilded incised letters. Above the arch is a group of five windows with terra cotta columns and archivolts; on either side are flanking towers, containing long triplet windows and crowned by bulbous domes. At the angles of these towers, which contain the main staircases, are piers surmounted by smaller domes, the whole facade being crowned with arcaded cornices and balustrade.

The main entrances are in an open vestibule guarded by iron collapsable gates and lined with enamelled bricks and terra cotta. In this vestibule are three doordays, two leading to the inner vestibules, from which are staircases to the main vestibule above; the centre doorway leads to the school room.

The auditorium is lighted by a large central dome, decorated on a ground of blue of gradually decreasing density. A richly carved casing of quartered oak, 16 feet wide and 15 feet high, encloses the ark. Around the highly ornamented pulpit of the rabbi and desk of the cantor, radiate in concentric circles the seats of the congregation. The main gallery extends around seven sides of the octagon and over the front vestibules.

The school room, which is almost on a level with the street, is divided by rolling partitions into eight class rooms.

The building is lighted with gas and electric light and heated by hot water and air.

The contractors were Messrs. Hutchinson & Carlyle.

REGULATIONS FOR THE CONDUCT OF GOVERNMENT COMPETITIONS.

THE Secretary of the United States Treasury has recently declared his intention to put in force the act passed by the United States Congress in 1893, providing for the obtaining by competition of plans for government buildings. The Acting Supervising Architect has prepared the following regulations governing such competitions:

1. At least five architects of good professional standing, who are citizens of the United States, shall be invited by the Secretary of the Treasury to submit plans, drawings and specifications in accordance with the conditions set forth in these regulations; and such plans, drawings and specifications shall be passed upon as to merit by the commission herein provided for.

2. A commission shall be appointed by the Secretary of the Treasury, consisting of the Supervising Architect of the Treasury Department and two architects, or experts in the construction of buildings, whose duty it shall be to judge and report to him as to the relative merit of the designs and plans submitted.

3. The office of the Supervising Architect will furnish full data and information as to the cost and the general requirements of the buildings placed in competition under these regulations, and the successful architect will be awarded a commission to prepare complete plans, drawings and specifications and to locally supervise the buildings won in any competition.

4. The architect to whom said commission is awarded will receive in compensation for his full professional services, including local supervision of said building, a fee computed at the rate of five per cent. upon all sums up to $500,000, 3½ per cent. upon the next $500,000 or any part thereof, and 2½ per cent. upon any excess beyond $1,000,000.

5. It must be understood that no claim shall be made upon the United States by any successful competitor for any fee, percentage or payment whatever, or any expense incident to, or growing out of, his participation in this competition.

6. The Department agrees to make selection from the designs submitted if, in its opinion, one suitable in all respects, as to design, detail and cost, be submitted; but expressly reserves the right to reject any and all plans, designs and specifications submitted, and to reopen the competition, if, in the opinion of the commission herein referred to, or of the Secretary of the Treasury, no design suitable in all respects has been submitted.

7. Each competitor must submit with his plans a detailed statement of cost.

8. It must be understood that a competitor will forfeit all privileges under these regulations who shall violate any of the conditions governing this competition, or who shall seek in any way, directly or indirectly, to gain advantage by influencing in his favor any of the commission.

9. No member of the commission herein referred to shall have any interest whatever, direct or indirect, in any design submitted in this competition, or any association with, or employment by, any of the competitors, and no employee of the Treasury Department shall be allowed to enter the competition herein provided for.

10. Each set of drawings, with its accompanying description, must be securely wrapped and sealed and addressed to the "Secretary of the Treasury, Washington, D. C.," plainly and conspicuously marked with the name of the building under competition, and without any distinguishing mark or device which might disclose the identity of the competitor.

11. There must be enclosed with each set of drawings, etc., a plain, white opaque envelope, within which the competitor will place a card bearing his name and address. The envelope must be securely sealed with a plain wax seal, having no impression, legend, device or mark upon it which might disclose the identity of the competitor.

12. Upon opening the packages containing the drawings, the commission will number the envelope containing the name and address of the competitor, and will place the same number upon

each drawing, plan, specification, etc., submitted by him and will preserve unopened the envelope containing such name and address until final selection shall be made.

13. The commission shall place out of competition any set of drawings as to which the conditions of these regulations have not been observed, and examine those remaining, giving to each the rank to which—in their judgment—its merits entitle it, and submit their findings to the Secretary and Treasurer.

14. The selection of one of the designs by the Secretary of the Treasury, and its subsequent approval by him, the Postmaster-General and the Secretary of Interior shall be final and conclusive.

15. In the event that the architect to whom the commission is awarded should prove to be an incompetent and improper person, the Secretary of the Treasury expressly reserves the right to remove him, to revoke the commission awarded him and to annul the contract entered into with him; but such architect shall receive equitable compensation for the work properly performed by him up to the time of his removal, to be fixed bv the Secretary of the Treasury.

16. The architect to whom the commission is awarded shall revise his competitive drawings to meet the further requirements of the Secretary of the Treasury, and upon the basis of these revised preliminary drawings shall prepare full detailed working drawings and specifications for said building; and shall thereafter, from time to time, make such changes in the plans, drawings and specifications as may be directed by the Secretary of the Treasury, for which just compensation shall be allowed; but no changes in the plans, drawings and specifications shall be made without written authority from the Secretary of the Treasury.

17. The architect to whom the contract is awarded shall, at his own cost and expense, when required to do so by the Secretary of the Treasury, make such revision and alteration in the working drawings and specifications of said building as may be necessary to insure its proper construction and completion within the limit of cost as furnished by the office of the Supervising Architect.

18. The sum upon which the Architect's commission is to be computed shall be the sum of money expended for the actual construction cost of the building, as ascertained by contracts awarded, not including furniture, gas and electric light fixtures and electric light plants.

19. The compensation herein stipulated to be paid to said architect shall be in full payment of all charges for his full services, inclusive of all travelling and other expenses.

20. The architect's commission shall be paid as the work progresses, in the following order:

One-fifth of fee when preliminary drawings are completed and approved in the manner herein provided; three-tenths of fee when general working drawings and specifications are completed and copies delivered to the Supervising Architect, and balance of percentage monthly, upon the basis of vouchers issued in payments for work performed.

21. Until the actual cost of the building can be determined the fee of the architect will be based upon the proposed cost of the work, as above indicated, and will be paid as instalments of the entire fee, which will be finally based upon the actual construction cost of the building when completed.

22. The Department will provide a competent superintendent of construction, whose qualifications shall be passed upon by the architect, but a selection must be made from a list of not exceeding six names proposed by the Secretary of the Treasury.

23. The architect is to provide for the use of the Treasury Department one set of tracings of all working drawings and of revised competitive drawings, two copies of specifications and one copy of detailed estimate of cost of entire building, all of which will remain in the custody of the Department, and to be and remain the property of the United States and not of the architect, but such drawings and specifications shall not be used for any other building, and the office of the Supervising Architect will furnish for the use of intending bidders all necessary photographic duplications of plans and copies of specifications.

24. Upon the award of the contract to the architect, all designs of unsuccessful competitors will be returned to them, and no use will be made of any of the drawings not accepted, or of any part that may be original, without consent of the author thereof.

25. Payments upon the work of construction under contract will be made monthly, at a rate of 90 per cent. of the value of the work actually executed and in place, upon vouchers certified by the architect in charge and countersigned by the superintendent of construction representing the United States government, which will be paid by a disbursing officer appointed by the Secretary of the Treasury.

26. The Supervising Architect of the Treasury Department will receive the proposals for contracts to be awarded, and shall likewise determine the manner in which the various branches of the work are to be contracted for.

27. All contracts, except for exigency purposes, shall be properly advertised for thirty days, and shall be awarded by the Supervising Architect, with the approval of the Secretary of the Treasury, to the lowest responsible bidder.

28. All further details necessary properly to carry out these regulations may be arranged by the Supervising Architect, from time to time, provided they do not conflict herewith.

29. The foregoing regulations shall be subject to modification and change at the pleasure of the Secretary of the Treasury.

CHIPS.

The death is reported of John Hartigan, contractor, Montreal.

Mr. Walter Mills, manager of the Silica Barytic Stone Co., of Ingersoll, Ont., has been made an honorary member of the New York Board of Trade and Transportation.

It is stated that A. Bradzeau, of Pakenham, Ont., intends utilizing his water power at Portage du Fort by putting in a plant for sawing stone, and that he will open his green serpentine stone quarry.

Mr. Forthingham, superintendent for Mr. J. E. Askwith, contractor for the Dominion Government Armoury at Halifax, N.S., fell from the walls of the building a few days ago, sustaining serious injuries. It is thought he will recover.

Salmon red or pale green grey walls look well with woodwork of cream, a frieze of cream, green gray or pink, having a cornice of cream, salmon, copper, and greenish grey, ceiling of light cream, with the upholsterings and draperies of greenish gray.

Mr. Arthur McGuire, Consul General to Canada for the Argentine Republic, sailed from Montreal for Buenos Ayres on the 14th inst. Mr. McGuire has organized a syndicate of Canadian and American capitalists to undertake the construction of public works in the Argentine Republic.

The Builder says that the custom of inscribing the name of the architect on new buildings has become practically universal in Belgium, and that not only the profession but the public regards the signature of the artist as being as desirable on a building as on a painting or a piece of sculpture; and it has even been suggested that it should be made compulsory.

The American Asbestos Company's mine at Black Lake, Que., was sold by the liquidators of the estate, Messrs. J. J. Penhale and R. R. Burrage, at Sherbrooke, recently. The purchasers were Messrs. L. & E. Wertheim, of Frankfort, Germany, the price being $14,900. This selling price only represents a fraction of the actual cost and value of the property.

TO COLOR IRON BLUE.—One hundred and forty grams of hyposulphite of soda are dissolved in a liter of water ($4\frac{2}{3}$ ounces to 1 quart); 35 grams of acetate of lead are dissolved in another liter ($1\frac{1}{6}$ ounce to 1 quart); the two solutions are mixed, are made to boil, and the iron is immersed therein. The metal takes a blue color, such as is obtained by heating it.

Extensive alterations have been made to the registry office at Guelph, Ont., under the superintendence of Mr. Benalick, contractor. The boxes for keeping the deeds, etc., are of steel, with nickel handles, and were furnished by the Lang Document File Co. The desks and office furniture are of quartered oak, furnished by the Newmarket Specialty Co., who are Canadian agents for the manufacturers at Rochester.

Judgment has been rendered by Mr. Justice Burbidge in an action brought by the government of Canada against Messrs. Puopore & Fraser, contractors for the Morrisburg canal. Some years ago the steamer Acadia, while passing through the canal, foundered upon a rock and sustained serious damage. Action was brought against the government by the owners of the steamboat and cargo, and judgment was recovered for about $45,000. Subsequently the government commenced an action against the contractors who were engaged in widening the canal, claiming that through their negligence a large stone had been deposited and left in the bottom of the canal, upon which the steamer struck. The judgment just rendered is in favor of the contractor and includes costs against the government.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

PROCEEDINGS OF THE SEVENTH ANNUAL CONVENTION.

THE seventh annual convention of the P. Q. A. A. was held in the city of Quebec on Thursday, September the 30th, and Friday, October the 1st. The members of the Association in the old city of Champlain were indefatigable in their efforts to make it a success, and it was a decided success, not only socially, but on account of the importance of the deliberations and of the resolutions adopted.

The members were welcomed with that large hospitality which is one of the characteristic features of Quebec, while the weather was delightful throughout.

With the kind permission of the municipal authorities and particularly of His Worship the Mayor of the city, the sessions were held in one of the spacious committee rooms of the new city hall.

The first session opened at 10 o'clock in the forenoon of Thursday, September 30th, under the presidency of Mr. A. T. Taylor. There were present: Messrs. A. T. Taylor, J. F. Peachy, A. Raza, A. C. Hutchison, Jos. Venne, S. H. Capper, E. B. Dussault, A. Mailloux, J. Nelson, J. A. Monette, J. P. Ouellet, J. Z. Resther, G. E. Tanguay, M. Perreault, C. Dufort, H. Staveley, D. Ouellet and A. H. Larochelle.

There was first the reading, by the Secretary, Mr. Jos. Venne, of the minutes of the two last general meetings, and afterwards the presentation of the annual report of the Council, as follows:

MR. J. F. PEACHY,
President-Elect Province of Quebec Association of Architects.

REPORT OF COUNCIL.

The council of the Association beg to present the seventh annual report of its transactions. Years are passing away and the Association enters upon the eighth year of its existence. Although the work has been quietly done, it has none the less been most useful and effective. The past year has continued to be one of depression in the building trades, but events point to a more encouraging and satisfactory state of things in the future for the profession generally. This report having been typewritten beforehand and distributed to the members, in accordance with the resolution passed at the last meeting, you will be able to appreciate the work of the council more fully and to note the progress which has been made.

COMPETITION OF PUBLIC ARCHITECTURAL WORKS.—Special attention is drawn to the negotiations entered into with the governments and the city of Montreal to induce them to throw open public architectural works to competition.

ARCHITECTURAL AND ARTS AND CRAFTS EXHIBITION.—The Architectural and Arts and Crafts Exhibition held in connection with the last annual meeting in Montreal was a decided success, being novel and exceedingly interesting. It was encouraging to find that the members responded so willingly and heartily to the formation of a guarantee fund and your council was glad to be in a position to return to the members a portion of the moneys subscribed, as the whole amount was not required. We take this opportunity of heartily thanking numerous friends who so readily lent valuable and precious objects of art for exhibition. An effort should be made to repeat at stated intervals similar or kindred exhibitions, as they have proved themselves to be one of the most effective means of promoting fellowship and progress amongst our members and a valuable method of education in art.

LECTURES AND DINNERS.—The winter lectures and dinners were organized on a new basis and the council congratulates the Association upon the good results obtained. The lectures were delivered in the Art Gallery, Montreal, which was kindly placed at our disposal by the Council of the Art Association, thus continuing during the past year many tokens of kindness to our Association, which are hereby gratefully acknowledged. Principal Peterson, of McGill University, very kindly consented to lecture for us on: "The Ruins and Antiquities of Athens," which proved most interesting. Prof. Capper, the recently appointed Professor of Architecture at McGill, also lectured on: "The Builders of the Egyptian Pyramids," Two other lectures were given respectively by our president on: "The Story of an Illustrious Abbey," and by Mr. Alex. C. Hutchison on: "Gothic Architecture in Northern Italy." These lectures were well attended by a distinguished and learned audience, ladies forming a notable addition and adding greatly to the brilliance of the gatherings. These lectures were all illustrated by diagrams and also by stereopticon views. Instead of monthly dinners as formerly, it was decided to hold only two dinners during the winter and to make these specially attractive. This was done and the result was very gratifying. The dinners were very pleasant social reunions of the members and during the evenings most profitable talks on architectural subjects were initiated. It is hoped that these opportunities for social intercourse will be continued and that more of the members will avail themselves of them.

FORMATION OF A DOMINION INSTITUTE.—As requested by a resolution passed at the last general meeting, the council, from its first sitting considered the advisability of the organization of a Dominion Institute of Architects and correspondence was opened with sister associations of British Columbia and Ontario; only the latter, however, has as yet responded to our advances. A draft of constitution was prepared by your council and sent to the Ontario association. Some legal points have been raised which are now under consideration. Many difficulties present themselves in the working out of such a scheme, amongst others the matter of ways and means and the economical and satisfactory working of such a Federal Institute in a great Dominion such as ours. They are not, however, insuperable, and your council hopes the undertaking may ultimately be consummated.

SCHEDULE OF CHARGES.—Your council has not been successful yet in obtaining the assent of the Lieutenant-Governor in Council to a schedule of charges. In the meantime, our recognized schedule of charges has had the signature of all the members attached, with the exception of one, and has been lithographed and distributed to all the members. It has already given proofs of its utility and has been of great help to some members in strengthening their position in transacting business.

COMPETITIONS.—The consideration of public competitions, especially in connection with public works, has had considerable attention in the course of the year, and your council thought it expedient to memoralize both governments and the city of Montreal. This important matter should not be forgotten in the deliberations of the next council, who could be instructed to continue the work commenced, and all cities, towns and municipalities should be approached in this matter. Private competitions, which may be termed frivolous, have been attempted, and some members were induced to take part in them. Some complaints having been made to the council, a circular putting forth the desired attitude of members in such cases was prepared and issued to members.

MR. FULLER'S SUPERANNUATION.—On the superannuation of Mr. Fuller, who has so long worthily filled the office of Dominion Architect, your council memoralized the government to increase the pension allowed him, if it was at all possible, in view of his long and valuable services. Although not immediately successful, it is hoped that our efforts may not have been useless.

GOVERNMENT APPOINTMENT OF CHIEF ARCHITECT.—Before the appointment by the government of a successor to Mr. Fuller. your council took the liberty of urging on the Federal government the great advisability of throwing open the architectural public work to architects generally instead of centralizing the same in the Dominion Architect's Department in Ottawa, so that the chief architect would be a supervising architect only, as the name implies, aud further that, in the appointment of the chief architect, integrity, competence and distinguished ability should

be the first conditions. An acknowledgement was received from the Minister of Public Works saying that the suggestions would be duly considered by the government when they come to make the appointment.

ASSOCIATION SEAL.—The committee having in charge the competition for a seal for the Association experienced some difficulty in completing its task. Although the honorarium offered was reasonable, only two competitors presented designs, and the council having accepted one of them, has had the seal made as it now appears on our letter headings, etc., the regular raised seal being kept in the offices of the Association. Your council trusts it will have your approval.

STANDING ART COMMITTEE.—Your council regrets to say that in spite of repeated and renewed efforts, the City Council of Montreal has not yet accepted our suggestions for the appointment of a Standing Art Committee, to advise and assist the council in matters affecting the beautifying of the city. A large number of names of leading citizens of Montreal was obtained and appended to the petition. Your council hopes, however, to be able soon to announce that this is an accomplished fact.

NEW BY-LAWS FOR THE CITY OF MONTREAL.—Your council is glad to be able to report that although the new building by-laws are not yet law, still they have advanced several stages this year. The sub-committee composed of aldermen, builders and a representative of the Association appointed by the City Council completed their arduous labors of going over the drafts prepared by us. A few amendments were made, some of which we accepted. The by-laws are now in the hands of the City Attorney, and it is hoped that at our next annual meeting your council will be able to proclaim them as law and in operation.

BENEFACTIONS.—The benefactors of the profession have not been numerous, but have distinguished themselves by their generosity. Chief amongst them must be mentioned the name of Mr. W. C. McDonald, not that his donations directly or immediately benefitted the Association, but we recognize that the creation and endowment of a Chair of Architecture at McGill University is amongst the most potent helps given to architectural education in this country.

LIBRARY.—The additions to the library have not been numerous during the year. Four volumes were presented by Mr. W. H. Dawson, through our President, on building construction, by A. Breyman, in German, and for which the thanks of the Association were tendered. In accordance with a desire expressed, books were allowed to be taken out of the library by members, but this privilege has not been taken advantage of to any great extent. Notwithstanding its actual usefulness, which has been especially proved in the case of a dispute on the use of some French words in a specification, it is very desirable that the books in the library should be increased so as to make it more valuable to the members.

MOUNT ST. LOUIS INSTITUTE.—The correspondence opened with Mount St. Louis Institute for the admission to matriculation of their pupils upon special lines, failed to materialize.

PORTRAITS OF PAST PRESIDENTS.—A gallery of photographic portraits of the past presidents of the Association has been commenced, and it is hoped will be continued. Nearly all ex-presidents have so far contributed personally to this object.

HONORARY MEMBERS.—His Excellency Lord Aberdeen, Governor General of Canada, having graciously intimated his pleasure to accept the office of patron of the Association, was duly elected to the office by acclamation at a special meeting of the Association. W. C. McDonald, Esq., was also, at the same meeting, elected honorary member for his generous help and benefactions in aid of architectural education in this province and throughout the Dominion.

OFFICIAL LIST.—Sixty-three members are actually inscribed upon the Official List.

NEW MEMBERS.—Three new members were admitted upon presentation of satisfactory credentials, and one new member by passing the registration examination.

STUDENTS' EXAMINATION.—Three students have passed the examination for matriculation during the year.

Your Council are glad to state that the Association has lost no members by death during this year.

There were ten regular meetings of the Council, seven special meetings, aud one general meeting.

ATTENDANCE AT MEETINGS.—A. T. Taylor, president, 18; A. Raza, second vice-president, 10; Jas. Nelson, 16; E. Maxwell, 16; A. C. Hutchison, 11; Jas. Wright, 7; R. Findlay, 8; Jos. Venne, 18. Messrs. J. F. Peachy, Chas. Baillarge and F. X. Berlinguet, being residents in Quebec, do not appear on this roll.

The Council cannot close this report without acknowledging its indebtedness to the newspapers for the many friendly and helpful notices they have given of the good work which our Association has at heart.

TREASURER'S REPORT.—The total receipts till September 7th, amounted to \$783.47 and the expenses, \$748.00, leaving on hand \$35.47.

The whole respectfully submitted.

(Signed) A. T. TAYLOR, President.
(Signed) J. VENNE, Secretary.

SECTION OF QUEBEC.

JOS. VENNE, ESQ., Secretary, Province of Quebec Association of Architects, Montreal

SIR,—The undersigned beg to present the annual report of the Section of Quebec. On November the 19th, date for election of our officers, Mr. Charles Baillarge was elected President for a third term, and Mr. J. G. Bussieres as Secretary.

Mr. Baillarge was requested to ask His Worship the Mayor of Quebec for a room in the new city hall in which to hold the meetings of our section. Mr. Baillarge made the demand as requested, but the hall that was offered was not accepted by the members of this section, and we consequently decided to hold our meetings, as in past years, in the offices of Mr. F. X. Berlinguet.

On February the 3rd, our section thought proper to indemnify our confrere, J. G. Bussiere, who until this day had incurred some expenses as Secretary. It was decided to pay him \$13.65 in addition to his annual honorarium of ten dollars.

On December 15th, our section asked the Secretary of our Association to obtain from the Council a copy of the "Gallery of Portraits of Past Presidents of our Association" to decorate the rooms of the Quebec Section, but did not receive these portraits.

Our section thinks it necessary to refer back to the resolution concerning the amendments to our charter, as proposed at the last annual meeting held at Chateau Frontenac, as follows: "The first paragraph of Section 13 of 54 Victoria, Ch. 59, is amended in striking off "registered" before the word "architect" in the third line, and to substitute "1898" for the figures "1891" in the first line of said paragraph." That Art. 2a be added at the end of Art 2 and shall read as follows: "The architect is believed under oath as to the requisition length and nature of his services." Art. 2 is amended in adding after the words "and all other persons" "and only such." Art. 5 is amended in striking off "a Secretary-Treasurer" and replacing them by a "Secretary" and a "Treasurer." The last paragraph of Art 7 is amended by adding after the words "five years" the words "preceding the 1st of July 1898." Art. 19a is added at the end of Art. 19, and shall read as follows: "All architects duly authorized to practice as such in this province shall be obliged to keep and preserve, in a convenient place and proof against deterioration, the original of all plans and specifications made and prepared by them." Art. 19b—Added to the exemption decreed by Art. 556 of the Civil Code of Procedure, "the safes, mathematical instruments, libraries, books of architecture and treatises on matters relative to the profession of architecture are not seizable, except for their purchasing price."

The whole report respectfully submitted.

(Signed) CHAS. BAILLARGE, President Section of Quebec.
(Signed) J. GEO. BUSSIERE, Secretary Section of Quebec.

QUEBEC, September 9th, 1897.

After the adoption of the report, the members were immediately invited to proceed with the election of their new officers, the result being as follows: President, J. F. Peachy; vice-president, A. Raza; 2nd vice-president, Prof. S. H. Capper; treasurer, E. Maxwell, re-elected; members of Council, A. T. Taylor, C. Baillarge, A. C. Hutchison, J. Nelson, O. Mailloux and L. R. Montbriant.

Mr. A. T. Taylor, in retiring from the President's chair, spoke as follows:

During the last sixty years in science and engineering, old methods have been revolutionized. We are so accustomed to the steam engine, the telegraph, the telephone, gas, electric light and power, that we sometimes forget that these were almost unknown before the Victorian era. Has there been a correspondingly progressive note in architecture? There has been progress, but of another kind. Perhaps I should say movement rather than progress—sometimes forward, sometimes retrograde.

The Gothic revival has come and gone, its chief influence being felt in Great Britain, but influencing in a lesser degree the continents of Europe and America. It forms an interesting chapter in architectural history. Its results have been fruitful. Initiated and fostered by the enthusiasm of Augustus Welby Pugin, and taken up by others, it was lifted up to an equality with the best old work by such men as Sir George Gilbert Scott, George Edmund Street, John L. Pearson, Burgis and their followers. It is for the present a spent force in civil architecture, but in ecclesiastical work it is erecting new cathedrals and churches that for knowledge of style, beauty of form and detail rivals mediæval work, and in the restoration and reparation of old work is on the same high plane. Not the least of the results is an abiding reverence implanted for the old Gothic heritage, and I trust that never again shall we see Gothic shrines degraded, neglected and effaced.

Since then we have had a carnival of styles, Queen Anne, neo-Grec, Egyptian, Jacobean, Florentine, Japanese, Moorish, Romanesque, all attempted in turn, with more or less success, according to the skill of the designer. At last the tide is setting in all over the world for a free classic style, a renewed renaissance, with adaptations from Italian Florentine, French Francois premier and English Elizabethan.

In France Gothic shone with a sunset glow by the perfervid and eloquent writings and utterances, and the consummate draughtsmanship of such great masters as Viollet le Duc and his associates, but since then a renaissance of a distant French type has obtained complete ascendency, marked by a certain refinement and originality, but somewhat lacking in warmth and verve. A country which can boast such buildings as the Louvre and the Tuilleries, the Hotel de Ville at Paris, Versailles and Fontainbleu, the great Chateau of the Valley of the Loire, to be a perennial inspiration to her sons, can never be devoid of a succession of buildings of merit.

In Germany, in Austria, in Belgium and even in Italy, the tendency is indisputably to dignified classic forms, rather than to more picturesque styles.

In the United States the Victorian era has been an interesting one. The old colonial buildings scattered over the country, many of them possessing great charm, were neglected and superseded by a growth of abortions, so outrageous in their design, so contrary to all the best accepted traditions of art that nothing but the crassest ignorance on the part of the profession and the public could have brought them into existence, or suffered them to continue. Within the last fifteen or twenty years, however, a great change for the better was inaugurated, the younger men went over to study in Paris and in England and returned with educated tastes, and many English architects settled in different parts of the States. The result was not always satisfactory, often incongruous and hybrid. Still the trend was decidedly towards vitality

and improvement. What appeared to be one of the most hopeful developments of this time was the romanesque movement, and in the hands of such a master as Richardson, gave not only promise, but fruition of great charm, suitability and beauty. Had he lived longer, a permanent and distinctive style might have been evolved. But there was no one to wear the mantle of the prophet, and, in the hands of numberless followers and imitators, it degenerated, and is not now a live factor in the architecture of to-day.

The most notable feature of modern work in the States is the close study it shows of Italian, and especially Florentine, Renaissance. The increase of travel, the multiplication of architectural publications, the ease with which architectural and art photographs of every description can be obtained, are largely responsible for this. So close is the study that it often becomes an actual transcript of old work, and it is a curious phase of existing practice that some of the leading architects in the States do not hesitate to plagiarize unblushingly.

Their domestic architecture can be more readily praised, and many country houses have a picturesque charm, a comfort, and a striking suitability most commendable.

To those who crave for originality regardless of other qualities, the development of the sky scraper or high buildings will be an interesting study. It cannot possibly be ignored—cradled in Chicago, it has grown into lusty youth and manhood in the large cities of the States. It is indigenous to the soil of America, and I am glad to say that it has not penetrated to any great extent into Canada, or been transplanted to the Old World. These erections are like the genii that the fisherman evoked and could not control. I do not know of any very high building that its architect can be said to have mastered; they invariably master their designer. Never in the world's history has so many important and costly buildings been erected of so outrageously ugly a character. Were they built for eternity, like the temples of Egypt or of Greece, we might well tremble for our reputation as architects in future ages, but fortunately—dare I say—they bear within themselves the elements of decay. I am satisfied that before long a more enlightened judgment, not to say taste, on the part of the public will condemn all such.

Coming to our own country, I was asked recently: Has Canada, with all her timber and forests and numberless wooden houses, developed any wood architecture? I had to confess that so far as I knew she had not. Since then I have asked myself, is there any reason why she should not? I cannot find any, and I throw it out to-day to you, my confreres, many of whom, doubtless, will have multiplied opportunities of constructing in wood, to take this into your serious consideration. We have often designed for stone and brick and executed in wood. If we study the architecture of the countries which are relatively similar to ours in the abundance of their timber, we may obtain useful ideas. Switzerland, for example, has many old interesting wooden houses well worthy of our study, such as those of Iseltwaldt, Monthovon, Fischenthal, etc. In Norway and Sweden, also, we have charming examples of natural and legitimate wood construction, with ornament not only beautiful in itself but appropriate to the material.

About fifty years ago, and since that time we have had some good architects in Canada—men of refined thought, educated tastes, and a wide knowledge of both classic and Gothic work. In Montreal they gave to us the head office of the Bank of Montreal, the Bank of British North America, the old Court House, the English cathedral, and other buildings. In Ottawa the original block of the Parliament buildings. In Toronto the main building of the University, and others there and elsewhere.

Succeeding these, diversity has reigned—a straining after originality, a new style which often resulted only in uncouth, ill-proportioned buildings, with badly designed detail; but of these I need not further particularize. Since that time, however, better training has produced better and more refined architecture, and gives promise of greater achievements in the future.

The establishment of a regular chair of architecture, through the munificence of one of our honorary members, Mr. McDonald, at our great University of McGill at Montreal, and the filling of that chair by a gentleman, now one of our number, who is an enthusiast in his work, well trained in the art traditions of the past, and who brings energy and the strength of his manhood to the training of students of architecture, augurs well for the future of our beloved profession.

Older countries have the advantage of having numerous examples of old, good work ever before the eyes of their architects. This is a comparatively new country. We have few antiquities of any kind, whether historical or architectural. What we have got it is our bounden duty to jealously guard and preserve. Indifference, ignorance or personal interest have been the factors which have robbed us of many an interesting piece of antiquity in Montreal. In this delightfully quaint and picturesque city of Quebec, full of the charm of antiquity and historic interest, and to which it is always a pleasure to come, permit my humble voice to say: Cling to everything that makes your city interesting from an antiquarian point of view. "Grapple them to your souls with hooks of steel." Already much of the full flavor and antique aroma has been lost; let no more go, as you value your noble heritage. Your old gates are nearly all gone, and only live in drawings and models preserved in the Redpath Library in Montreal. On a recent visit St. John's gate was in process of demolition; although not an ancient gate it is worth preserving. Another scheme contemplates levelling a portion of your old city walls, which, I trust, the good sense of the citizens will never permit. Many a city would give much to possess your glorious legacy from antiquity.

All over the province the quaint old village churches with their golden spires are being replaced with structures—many of them exceedingly pretentious and "towny," if you will permit the word. Not long ago in a small village I counted five towers and spires on one church, surely adjuncts unnecessarily abundant in a country parish. Personally, I regret to see the disappearance of the simple rural church hallowed by many years of worship and round which the social life of many generations has been nurtured.

Fellow members, let us broaden our minds with an enlarged knowledge of the sister arts—painting, sculpture, archæology, and the industrial arts, as they touch and affect our profession; nothing is too trivial in our work for the genius of art to beautify. The higher our ideals the better will be our work. It may not be appreciated now as it ought, but some time it will. Many noble buildings have come down to us from antiquity—the very name of their architects often unknown, and yet they have been a joy and an inspiration to countless numbers. I sometimes think we have the best and most interesting profession in the world. We touch life at so many points; we have so much power in our hands to sweeten and enrich the existence of our fellows. Let us accept our work as a sacred trust, not as a means simply of making money or gaining a livelihood. Let us rally round our Association; it must prove mutually helpful to ourselves and to the community at large.

The members were then called to discuss the proper measures to be taken in order to protect more effectively the licensed and duly qualified architects against the competition of unqualified persons who arrogate to themselves the honorable title of architect without being able to give an equivalent for the fees which they exact. It was generally admitted that it was time for the Association to act for the good of its members in this direction, otherwise it would soon have no standing.

The new Illinois architect's license bill, as published in the last number of the CANADIAN ARCHITECT AND BUILDER, and which has for its object the organization of a state board of examiners of architects with all the ordinary powers given to a committee of this kind, was given as an example of what ought to be done in the province of Quebec.

After a lengthy debate lasting till the luncheon hour, and resumed after luncheon till 3 o'clock in the afternoon, the question of amending the charter in that sense was left to a special committee composed of Messrs. Berlinguet, David Ouelett, Baillarge, Tanguay, J. Z. Resther, Maurice Perreault and J. Nelson, with all the general officers of the Association, with power to add to their number if necessary. This committee is instructed to report to a general meeting of the Association in Montreal, early in November next. Another meeting of the Association will also be held in the city of Quebec sometime before the opening of the Legislature.

On the proposition of Mr. Hutchison, seconded by Mr. Mailloux, it was decided that the next general annual meeting of the Association will be held in the city of Montreal at a certain date to be fixed by the Council. This closed the regular business session.

The next item on the programme was a lecture by Prof. S. H. Capper, of McGill University.

The following is a resume of Prof. Capper's lecture. The full text of the address will be presented in our next issue.

Mr. Capper took as his subject "Architectural Notes on New York Tall Buildings," and treated it with a view to initiate some general discussion among the members of the Association. He first commented on "towering" as an ideal in art, exemplified in the architecture of America by the tower of the city hall at Philadelphia, and by the memorial obelisk at Washington, both of exaggerated height, but not otherwise remarkable as artistic efforts. The former to obtain its actual height was distorted in design; the latter was a reductio ad absurdum of the ancient Egyptian monolith.

The tall buildings of New York and other American cities must be accepted as the outcome of modern requirements, due principally to the enormous initial cost of the sites available. The engineering problems involved were many and complex, but they were being solved with the greatest skill by contemporary engineers. The aesthetic problems involved were no less difficult, and did not offer so easy or complete a solution. The lecturer reviewed the modern "tall building" as developed in New York, criticising it from the architectural and aesthetic standpoints; he dealt with the question of ornamentation and incidentally discussed the question of concealed steel skeleton construction and the employment of stone as the material for casing in the constructional metal frame. The horizontal and vertical principles of design for these buildings were contrasted and compared, the lecturer favoring the former; and the isolation which allows these buildings to be judged of as a whole was also noted. In conclusion reference was made to the general effects of these buildings, now that their number has so largely increased, upon the aspect of New York itself as seen on approaching the city from the harbor.

After some congratulatory remarks of the new president of the Association, Mr. J. F. Peachy, and a cordial vote of thanks to the lecturer for his scholarly and instructive lecture, the President called for a discussion upon the subject of the paper.

Mr. Venne said that the aesthetic problem of the construction of the tall building was a very hard one to solve, but he would assume without risk of mistake that the "sky-scraper" of New York and Chicago was far from having the aesthetic aspect of the architectural masterpieces of the European cities. Near by these towering buildings, monuments like "La Magdeleine" and other grand cathedrals of the old world would suffer in their artistic appearance. If the cathedrals of "Notre Dame de Paris" and of Amiens were placed beside those sky-scrapers of New York and Chicago what would they look like? There was a diversity of opinion regarding the necessity for these tall buildings. Personally, he thought they were unnecessary, and was of opinion that architects and builders would before long return to normal conditions of building.

Mr. Venne, who was mentioned on the programme as the next lecturer, in spite of the lateness of the hour and the fact that he had unfortunately left his manuscript behind, gave from memory and with the aid of a few notes written at the last moment, his lecture on "The Aesthetic Function of Mouldings and Profiles."

By the courtesy of the author our readers will have the privilege of reading the full text of this paper.

Prof. Capper had taken for his subject a question of ensemble so to speak; Mr. Venne said that he had chosen to treat and discuss a subject of details: the mouldings and their object and effect in architectural art.

Thanks were given to the lecturer by the President, Mr. Peachey, in the name of the Association.

Mr. Hutchison asked permission to make some few remarks on the lecture of Prof. Capper. He said that tall buildings in the cities of Chicago and New York were in many cases no more nor less than gigantic and monstrous boxes. They were nothing else than engineering feats. If you ask the architects of those tall buildings how they are determining the proper architectural treatment to give to such buildings, they will say in many cases that they are considering and treating these towering constructions as mere columns, dividing them with regard to ornamentation into the three distinct parts of a column —the base, the shaft and the cap. Mr. Hutchison said that the tall construction was at an experimental stage, and it was not easy to decide about the proper treatment it ought to receive. Steel and iron were more and more in use in buildings. Architects in their designing ought to deal with these materials in such a way as to make them more pleasant features in construction.

Mr. Andrew T. Taylor, the ex-president of the Association, spoke of the threatening danger of these tall constructions in iron and steel. These materials are exposed to rust, and, being covered, the action of rust cannot be easily detected. In some fifty years from now a sudden collapse would certainly happen in many cases, if proper and timely measures were not taken to prevent it. He predicted that in less than one hundred years from now most of these tall buildings will be no more, while the tall monuments and constructions in stone of the old world—those of ancient Egypt, for instance—are still standing, after three thousand years of existence.

The President reminded the members present that they were expected to attend without fail at the annual banquet, at 7 o'clock p.m., at the Victoria Hotel.

ANNUAL BANQUET.

The annual dinner was a very sumptuous and enjoyable affair, the tables being beautifully ornamented with tropical plants and flowers. The banquet was given in the private dining-room of the hotel, and was served in a manner that left nothing to be desired and that reflected great honor upon the management. It included all the delicacies of the season, as the following menu will show:

MENU.

Huitres en Coquilles

SOUPE.

Consommé à la Royale.

POISSON.

Saumon Frais, Sauce Hollandaise. Pommes de Terre Pailles.

ENTREES.

Timballes de Poulet à la Reine. Filet de Bœuf, piqué aux Champignons.

ROTIS.

Dindonneau farci, Sauce aux Atocas. Gigot d'Agneau a la Parisienne.

MAYONNAISE.

Homard. Poulets. Laitue.

LEGUMES.

Pommes de Terre à la Creme. Haricot Verts a l'Anglaise.

Celery. Petits Pois a la Francaise. Asperges.

ENTREMETS.

Victoria Pudding, Cognac Sauce. Bavaroise au Chocolat.

Tartes Assorties. Geleé au Champagne. Gateaux Assorties.

DESSERT.

Raisins. Noix Assorties. Amandes. Pommes. Poires.

Raisins de Serre. Creme à la Vanille.

THÉ. FROMAGE. CAFÉ.

Those present were: J. F. Peachey, President; A. T. Taylor, Alex. Hutchison, Jas. Nelson, O. Mailloux, Professor Capper, J. Z. Resther, Jos. Venne, A. Raza, D. Ouellet, G. Tanguay, E. Dussault, C. Dufort, J. A. Monette, J. P. Ouellet, architects; J. B. Mortimer, of the CANADIAN ARCHITECT AND BUILDER; N. Levasseur, secretary of the Chamber of Commerce of Quebec; T. Moloney, of the Provincial Secretary's Department; Mr. Barthe, editor of La Semaine Commerciale; Mr. Carrel, of the Daily Telegraph; Mr. Chambers, of the Morning Chronicle; G. Levasseur, journalist; and some other representatives of the press of the cities of Quebec and Montreal. General regret was expressed at the absence of Messrs. Baillarge and Berlinguet, who had been called out of the city by professional engagements.

After a couple of hours had been devoted to the delicacies of the menu, the guests were called on to honor the official toasts, as follows :

1st. "The Queen." In proposing this toast the President, Mr. Peachey, made allusion to her glorious jubilee.

2nd. "The Governor-General, Patron of the Association." The President spoke briefly of the manifest sympathy of His Excellency, Lord Aberdeen, with the Association, having graciously accepted in the course of the year the title of patron.

3rd. "The Government of Quebec." In the absence of any members of the Provincial Government, Messrs. Barthe and Maloney were charged by the President to reply. Both speakers did not hesitate to pledge the assistance of the government to the Association in its efforts to secure needed amendments to its charter.

4th. "Sister Associations." Professor Capper, called by the President to reply to this toast, said that, according to what he had heard from the Secretary, the sister associations were not very sympathetic. The sister association of British Columbia had not answered the call of the Association of the province of Quebec to second a movement for the formation of a Federal Institute of Architects, and the answer of the sister association of the province of Ontario did not amount to much.

Mr. Hutchison thought proper to say that it would not be fair to accuse the sister associations of Ontario and British Columbia of indifference or apathy. He was sure that they were at heart and in spirit with their sister association of Quebec. Their aims and objects were the same, but the distance at which they were separated from this association had doubtless much to do with their seeming indifference.

5th. "The Press." Suitable responses were made to this toast by the representatives of the CANADIAN ARCHITECT AND BUILDER and the local press.

A toast to the health of the absentees, Messrs. Berlinguet and Baillairge, was afterwards proposed by Mr. N. Levasseur, and replied to by Messrs. Raza and Venne.

The proceedings terminated with a toast to the health of the President of the Association, proposed in forceful terms by Mr. Chambers.

SECOND DAY.

On the morning of Friday, the second day of the convention, carriages were in waiting at the Victoria to convey the members of the Association to the station of the Quebec, Montmorency and Charlevoix Railway. The ladies, who had been unavoidably neglected to some extent the day before, were invited to participate in an excursion to the famous shrine of Saint Anne de Beaupre, passing on their way the Montmorency Falls.

They were in the celebrated sanctuary by 11 o'clock, viewing its sumptuous altars in marble, monument to Saint Anne in Mexican onyx, its historical treasures, and pyramids of crutches, left there by miraculously cured pilgrims. Full explanations were given to the visitors by one of the good fathers of the church. Every member of the Association, especially the strangers, seemed to be interested to the highest degree.

Visits were afterwards paid to the old sanctuary, the Fountain, the Scala Sancta, and the village itself, with its numerous and extensive hotels. Everything is historical in the surroundings here. A passer-by sees the remains of old fortifications erected before the siege of Quebec, under the French.

Mr. Francois Parent offered the hospitality of his sumptuous home, where the visitors were received most cordially by Mrs. Parent. Part of the residence of Mr. Parent was used by Montcalm as his headquarters during the siege, and history states that the treaty of capitulation was even signed there. Mr. Parent, who is now the proprietor of an extensive brewery, is a mason contractor by trade. He offered a toast to the health of the architects, and in particular those of the Association.

Mr. Andrew T. Taylor offered the sincere thanks of the Association to Mr. Parent, and said that he was particularly impressed by feeling that he was speaking in the very room where such an important event as the capitulation of Quebec had been decided and the treaty signed.

At 3 o'clock, after luncheon, the members of the Association took their final drive. On account of the late hour, they had unfortunately to shorten it. Nevertheless, it was interesting. They passed by the heights of Ste. Foye, and the village and church of that name, to the famous cave, on the shores of the river, above Sillery Cove, used by a celebrated Canadian brigand called Chambers in 1837, and were shown at a little distance the site of the proposed new bridge for railway purposes between the north and south shores of the St. Lawrence at Quebec.

At six o'clock they were back to their headquarters. Most of the Montreal members were leaving the same night by rail.

The ladies who favored the tourists with their presence on the excursion were Mesdames Nelson and Levasseur and Misses Mailloux and Dufort.

PERSONAL.

Mr. George Wilson, a prominent contractor, of New Edinburgh, Ont., died recently at his home in that place.

Mr. Wm. Rae has recently been admitted as a partner with the firm of Strickland & Symons, architects, Toronto. The firm will in future be known as Strickland, Symons & Rae.

Mr. Walter Chapman, C. E., of Barrie, has been appointed chief engineer of that department of the Grand Trunk Railway extending from Toronto to Nipissing and westward to Detroit. Mr. Chapman's headquarters will be at Hamilton.

Mr. Ernest R. Rolph, architect, of Toronto, has removed to the Northwest territories, having received an appointment from the C.P.R. to design and superintend the construction of buildings in connection with the Crow's Nest Pass railway. Mr. Arthur E. Wells, who has been in New York city during the last five years, has returned to Toronto and assumed charge of Mr. Rolph's practice.

The death occurred at Montreal last month, of Mr. Frederick Preston Rubidge, who was for thirty years architect of the Public Works Department at Ottawa. Mr. Rubidge had attained the age of ninety-two years. He retired from the public service in 1872, afterwards removing to Hamilton and later on to Montreal. He was highly esteemed both on account of his personal qualities and the ability which he displayed in the practice of his profession.

Thomas Heaven, of Hamilton, Ont., has recently patented in the United States and Canada a furnace that is said to be capable of burning all kinds of fuel, such as wood, hard or soft and lignite coal. The furnace is largely constructed of steel.

Incorporation has been granted to the St. Lawrence Portland Cement Co., with a capital of $25,000. The charter members of the company are : E. S. Scott, Quebec ; M. J. Butler, Napanee ; F. G. B. Allan, Napanee Mills ; R. C. Carter, Kingston ; F. S. Rathbun, Deseronto, and J. N. Greenshields, Montreal.

THE LATE MR. F. J. RASTRICK.

IT is with deep regret that we chronicle the death of Mr. F. J. Rastrick, of Hamilton, one of the oldest and most highly respected architects of Canada. In the early days of the Ontario Association of Architects, Mr. Rastrick was one of the most enthusiastic and useful of its members. In recognition of this fact he was appointed by Order-in-Council a member of the first Council. Of late years, owing to advancing years and physical infirmities, he was unable to take an active part in the work of the Association.

The deceased was the third son of John Urpeth Rastrick, civil engineer of Layas Court, Surrey, England, and was born at Westbromwitch, Staffordshire. He received his education in Yorkshire and London ; then entered his father's office to study civil engineering, and afterwards was articled to Sir Charles Barry, F.R.I.B.A. At the expiration of his term of five years he was elected a student of the Royal Academy. He then went to Belgium to measure and make drawings of St. Jacques church, Leige, for Weale's Quarterly. He afterwards studied in Paris, Rome, Vienna and Munich, and travelled over Europe, Asia and Egypt, perfecting himself in his profession. He returned to England in 1848. In 1850 he opened an office in London, and in 1852 came to Canada and located in Brantford. From that city he removed in 1853 to Hamilton, where he continued to reside during the remainder of his life, and designed and superintended the erection of many important buildings. He was also largely instrumental in establishing the Hamilton School of Art. He was a Past Master of Acacia Lodge, A. F. & A. M.;

THE LATE MR. F. J. RASTRICK.

President of St. George's Society during four years ; President of the Mechanics' Institute for a like period ; Past and Vice-President of the Sons of England, and a life long member of the Church of England. Mr. Rastrick was married on the 21st of July, 1857, to Anna Mary, daughter of Capt. E. L. Stephens, R. N., of Southampton, England. He leaves a family of one daughter and four sons, one of whom, Mr. E. L. Rastrick, succeeds to his practice.

Messrs. Brown & Temple, Brockville, state that the ARCHITECT AND BUILDER and CONTRACT RECORD is the best $2 investment any firm connected with the building trade can make.

THE LATE MR. ROBERT MITCHELL.

THE recent death of Mr. Robert Mitchell, brass founder, removes a prominent landmark from the ranks of business men of Montreal. The accompanying portrait will recall to the minds of many of our readers his familiar features, as well as his long and useful business career.

The late Mr. Mitchell was at the time of his death in his seventy-sixth year. He came to Canada from Scotland, his native land, in 1848, and engaged with Messrs. Bryson & Ferrier, of St. Paul street. In 1851

THE LATE MR. ROBERT MITCHELL.

he commenced business on his own account on St. Henri street. Six years later he removed to the corner of Craig and St. Peter street. In 1889 these premises had become too small and a commodious factory was erected at St. Cunegonde, the former premises being used as offices and show rooms for gas and electrical fixtures and other lines of brass goods. In 1893 the offices and show rooms were removed to their present location at No. 8 Bleury street.

Subsequently the business was merged into a joint stock company, under the name of Robert Mitchell & Co., Limited.

In addition to many first-class private residences, Mr. Mitchell fitted up the following public buildings : City Hall, Post Office, Street Railway offices, Y.M.C.A. building, Imperial and Standard Insurance buildings.

The late Mr. Mitchell took no active part in public affairs beyond serving as governor of the Montreal General and Western Hospitals, and being connected with the Board of Trade. He leaves a widow, two sons, Messrs. Richard and Norman Mitchell, both of whom are connected with the company, and three daughters.

Mr. W. A. Reynolds, of Hensall, Ont., in remitting his subscription, writes : "I am well pleased with the ARCHITECT AND BUILDER and CONTRACT RECORD, and wish the paper every success."

Under section 74 (2) of the London Building Act it is necessary that in every building exceeding 10 squares in area used in part for purposes of trade or manufacture and in part as a dwelling-house, the part used for purposes of trade or manufacture shall be separated from the part used as a dwelling-house by walls and floors constructed of fire-resisting materials, and all passages, staircases and other means of approach to the part used as a dwelling-house shall be constructed throughout of fire-resisting materials.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

A WOOD CARVER'S VIEWS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—The people of Canada appear to be at last awakening to the fact that they have a grand country—worthy to ~~be classed~~ among the nations of the earth—and that they are possessed of all the qualities that make for success, in quite as marked a degree as the people of any other nation. It is to be hoped that this feeling of self-confidence and respect will grow, until it reaches even the building trades.

As far back as my experience reaches, Canadians have been given second place to the stranger in their own country. The boy who served an apprenticeship to a trade, and who most likely possessed as much ability as the stranger, was forced to take a back seat at home, or leave his native land in search of appreciation elsewhere. I have often heard the stranger tell the native that "If he did not like the treatment he was receiving he could go somewhere else," and he went. He may come back some time, but, if we wish to retain him as a citizen, we must show him that we are prepared to give him at least an equal chance with the stranger, and that we appreciate his worth. I have worked in some of the best architectural and furniture carving shops in Canada and the United States, and have met some very clever workmen from all parts of the world. I have always found the Canadian in the United States shops receiving the average wage, and in some cases reaching and holding his own in the front rank. I have never known a Canadian to be occupying an inferior position anywhere, except in Canada. I have worked with as many as one hundred and sixty carvers in one shop, and among those who lost least time, did the most and best work, and received the best wages, were always to be found more than one Canadian.

If this is the case in the United States among men of all nationalities, why is it not so in Canada? Because we do not give the Canadian the same chance. We have always been too ready to extend the "glad hand" to the foreigner, with the idea that, coming from the older country, he must know more than we do. As soon as he arrives there is always someone to help him into the position that rightfully belongs to the boy who learned his business with us.

Some ten years ago there were gathered together in New York city the greatest collection of wood carvers ever seen anywhere—some of the best men from Italy, France, Germany, England, Scotland, and, of course, Ireland—in fact, they came from all countries and were of all grades. Mr. Philip Martinz, who did so much of the best work at the World's Fair in Chicago, was one of them, and was not regarded as the best by any means. The work was of the very best class of Italian Renaissance, and rivalry ran high. As soon as something was produced that was looked upon as good, the others would set themselves to produce something better, and every week or so a piece of work was turned out by someone, that was voted by all, "best yet." Of course the Italian was generally first, with the Frenchman a close second—all others scattered. The Canadian and United States carvers were quick to seize their opportunity, and it surprised everyone how quickly they picked up the loose ends, and, step by step, bettered their position in the ranks, until, when the end came, and they were all scattered far and wide, the carvers of this continent were working shoulder to shoulder with the picked men from all Europe, receiving the same wages as the best of them, which is positive proof that they did as good work.

At the same time that the carver was proving himself as good as his brother, the carpenter and cabinet-maker had been passing through a similar experience, and came out of the test with their heads up.

It is a well-known fact, to all who have worked in the United States, that some of the best men in the furniture trades are Canadians. In the best shops in Boston, New York, Cincinnatti, Chicago, Grand Rapids, Canadians are to be found in one or more departments, filling the position of foremen, and in some cases the manager and foremen, from top to bottom, are all Canadians, and most of those who hold these positions, also hold honorably cancelled indentures of apprenticeship from Jacques & Hay, of Toronto, although I have met some from Bowmanville, Oshawa, London, Montreal and Quebec. One of the most successful furniture manufacturers in Grand Rapids, Mr. John Mowat, is a Canadian and a Jacques & Hay apprentice.

It is not, therefore, for any want of ability that Canadians do not remain at home, but entirely from lack of opportunity and because of the lack of faith in their ability. The manufacturer, the architect, and business man generally, are largely to blame for the existing state of things. They have in the past given the preference to men from the old countries, being Old Countrymen themselves. As a rule, they could not be induced to believe that the boy brought up in the bush could possibly have as much knowledge as the mechanic from "home." So, when a stranger landed here, unknown and poor, who claimed to be a builder, for instance, he was taken in hand and helped along. The bank helped him, the architect gave him his confidence, and he became known as a "successful contractor." In some cases he was a good fellow, and is with us yet; in other cases he left us monuments of his ability in the shape of unfinished blocks of buildings and unpaid claims; while the Canadian, who stayed at home and tried to establish a business for himself, was looked upon as a man of little experience or ability, and left to do the best he could.

I have tried to show by all this, that we have, in the past, neglected to encourage our own people, while we have freely helped the foreigner. We depreciated our own ability, and failed to inspire others with confidence in us, because we lacked confidence in ourselves. If an expert opinion was required, we sent to some foreign country for it, and paid a large price for it.

This is not the way to build up a country, and the sooner we make a change in our methods, the better it will be for us all. Canadians should have the first say in all matters which affect Canada. Canadian architects, engineers and experts should be consulted in preference to foreigners. I am looking for the good time that is coming for us all, when good, honest work will be asked for, and the man who will give the best class of work, for a fair price, will be considered the best man to deal with. In these days of competition, it is the man who will do work cheapest who is looked upon as the best man to employ. The wood carver suffers in this way. The good man has not only to compete with the cheap man, but has to contend with all sorts of substitutes. Compositions of all kinds are handled by people who should know better. The idea that all, or any of these substitutes, are cheaper than good honest wood carving, is wrong. Wood carving can be and is done every day for as little money as plaster ornament is made. I have been asked to tender on mantels, the ornaments for which were to be either wood carved or gilder's composition; the figures quoted for wood were only a few cents more than the cost of composition. This is not fair competition, but it is the way we do it in Toronto. I do not blame the architects, because, for a great many years, they have been paying for good work and not getting it. The want of ability to do good work, on the part of the class of carvers who have been doing work in Toronto, is evident to anyone who inspects the work they have done; and it must be remembered that the carvers who have been doing the work in Toronto have not always been Canadians. Men have gone into business for themselves, who, as journeymen, found it somewhat difficult to keep up their end at the bench. Others who have been in business did not understand wood carving as well as they understood stone carving.

I am prepared to prove that it is almost impossible to be at the same time an expert wood and stone carver. It is always possible for a stone carver to do a little wood carving, and vice versa, but the man who would be an expert at either, must stick to one or the other. A stone carver tendering on wood carving will tender high, because he will take more time, and when it is done it can always be recognized, by its want of spirit; it lacks that lively, sketchy appearance, which the expert wood carver could give it. It was this "artistic indifference" in the treatment of the wood carving, by the Italian carvers who worked on the Vanderbilt work in New York, which surprised the stone men into the admission that the wood work was far superior to the stone.

The architect who has been fighting for good work at a fair price, has generally got rubbish at a high price. The method of asking for tenders, and giving the work to whoever is lowest, is not calculated to produce the best results, neither is the method of holstering up one man, as being the only one who can do good work. Another way of doing it is to let the contract for all wood work, including carving, to a builder. Say that it is estimated that there is $500 worth of wood carving on the job. The builder will sub-let the carving to the man who will do it cheapest, and save probably one-third of the original estimate. This method

will not produce good work. Another way is to ask a builder for an estimate and give this estimate to all builders tendering, with the understanding that the carver who gave the estimate is to do the work. When the builder signs the contract he takes the liberty of handing the carving to someone else, who will do it cheaper. The architect who allows this cannot expect to get value for his money. If the builder employed his own carvers, and could satisfy the architect of his ability to do as good work as he who gave the original estimate, it would not be so bad, but it is not right in any case. Another reason why good work is not done, is because some architect will ask for tenders on a scale drawing, and when the details arrive, the carver finds himself in a good-sized hole; he is afraid of getting the worst of it, and slights the work, making trouble all round.

Estimating on the value of carving, from a good drawing, is guesswork at best. The carver estimates according to his interpretation of the drawing, but if he has to compete with cheap men, he has to guess how low he can go without getting stuck, and how high he can go and get the work, for if he is not lowest, he is not likely to get it. He seldom estimates on the real value of the work. It would be better if the architect would consult the carver as to how much and how good he could do the work for so much money, and let it go at that, seeing to it that the carver lived up to his agreement. The fact of the matter is, that no man can tell the value of a piece of carving before it is done. It may take a day to do a piece of carving in a fairly effective way, and a week can be spent in doing the same piece of work. The size of work does not count half as much as the way it is done.

A change in the method of estimating the cost of carving would do away with many of the evils. If an architect gave an order to do certain work for a certain amount of money, it would be to the carver's best interests to give him full value, and carry out his ideas. I have known work to be done in this way that resulted in a saving on the original estimate. There is one shop in New York where this plan is adopted, and the result has always been satisfactory. It is necessary to this end, however, that the carver should be capable, as well as honest. The architect who is known to be easy to please, will not have to pay as the man who is known to be hard to please, neither will he who is known to be easy get as good work. I like the man who is particular about the quality of the work he is getting, providing he will say so from the start, and show clearly what it is he wants. But when an architect tries to get a low estimate by submitting a scale drawing and saying, "I don't want anything too fine," etc., etc., and then finds fault with the work he is getting, he is not doing himself justice, nor does he get the best results. It is to be hoped that the architect and his carver will put their heads together, and arrive at a better understanding. Then we will get better work, and there will be less trouble, while, as a consequence, there would be as much likelihood of a reduction as of an increase in the cost of the work.

Yours, &c.,
W. N. MCCORMACK.

12 Lombard street, Toronto.

THE MARITIME PROVINCES.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

BUILDERS in general throughout this section are congratulating themselves on having had a fair season's work. Though no buildings have been erected of great importance during the summer, yet sufficient work has been carried on in buildings of a smaller order and in repairs made, to keep all the workmen busily employed throughout the season. In all building lines one hears, in answer to query, "can't complain."

Early in the season the building fraternity watched with interest the issue of the popular movement in favor of a free public library. Had the city accepted the site offered by would-be philanthropic donors probably the money would have been forthcoming for the erection of the library. As it was their delay caused the withdrawal of the offer, and chances are that if the project is carried out another year the site must be purchased. Many still believe another year will see its fulfillment, and it seems pretty well understood that in such a case the design must be of an order to be a decided addition to the beauty of the city.

The works of the present, the construction of the big docks and warehouses on the Carleton side of the harbor are very extensive, and indicate some preparations being made by St. John for the long looked and hoped for handling of the winter maritime business of Canada which, if obtained, will mean much to the future building trade of the city. The new docks give accommodation for the largest of ocean going vessels, and are of great length and capacity. Hundreds have found employment in the work—in the surveying, dredging, pile driving, timbering and ballasting, and a large force of carpenters was required in the erection of the buildings. Had it not been for this work of magnitude there would have been noticed a depression in building circles.

The new fire engine house and hose station in the north end, which may approximate about $12,000, and which is being done by Sproul & Corbett, under superintendence and from designs made by R. C. John Dunn of this city, is well under way, and will be a fine building of brick and stone with a good appearance. Other works of construction throughout the city are of lesser importance.

A fine residence is being built on East King street, and on Wellington Row contractor Bates is pushing to completion a handsome residence for Dr. Magee. The new house for Chas. T. Nevins, on corner of Queen and Canterbury streets, is well under way, and in Portland the houses of Mr. Flewelling and Geo. Hoben are nearly completed. A number of other buildings are going up about the city.

The Diciples of Christ have had different plans under consideration for the building of a brick house of worship on Douglas avenue, but they will not begin operations until another spring.

The improvements to St. Rose's church spire in Carleton have now been completed and the church presents a fine appearance.

A small Anglican church at Red Head is being built, though the plans at first intended to be used have been given up.

Outside the city an average amount of building is being carried on.

At Fredericton some good structures are going up, chief among which is the Edgecombe building of brick. The burning of the brick Deaf and Dumb Institute there may necessitate its rebuilding next summer, though a decision to that effect has not yet been arrived at.

Sir Wilfred Laurier, on the occasion of his recent visit to Moncton, laid the corner stone of a large high school building.

The masonry of the new town hall in Chatham is now completed by B. Mooney & Sons, of this city, and tenders are asked for construction of a brick fire engine house and town offices in Amherst, N. S. As this is the seat of the big contracting firm of Rhodes, Curry & Company it is expected that they will secure the job without much opposition.

In Annapolis, N. S., a masonic temple of brick and stone with 40 feet frontage, to cost about $5,000 or $6,000, is going up.

The new Lefebore Memorial Hall at Memramcook is now completed exteriorly; it is a fine specimen of architecture, and the interior is also finished in good taste.

At the recent exhibition held here a fine exhibit of granite was made by the Dominion Granite Co. Their showing of black granite attracted particular attention by its marked brilliancy and by the prominence in which the letters stand out without being painted. Experts have said that this black Welsford granite is the finest that can be found, and the owners of the quarry are filling large orders, some to Scotland and England.

The rise in the U. S. tariff on undressed building stone to 12 cents a cubic foot or 40% of cost, three times what it formerly was, has affected the stone business in this locality to a considerable extent. Some of the best and handsomest building stone obtainable is quarried in the maritime provinces, and those interested are disappointed that the Canadian tariff is not higher. In shipping from here to Montreal and points west the American article has also great advantages in freight rates. Competition from Scotland is even greater—the long overland haul from here being from $4 to $5 per ton, as against only $1.25 from the old country.

That Toronto thinks well of our stone is evidenced in its new municipal building, constructed of brown stone from the Woodpoint quarries in Westmorland County, N. B. Among other structures built of this stone is the drill shed in Halifax, costing a quarter of a million dollars, the new high school building erected last year in this city, and the Wygoody building on Germain street.

City Inspector Meagher is endeavoring to create greater respect among the builders for the by-law which provides for panelling brick buildings. A meeting will be held to reconsider the question.

The winter mechanical drawing classes have been reorganized at the Y. M. C. A. under the instructorship of H. H. Lordly, C.E., and F. G. Burton, B.A. So little opportunity is afforded in the city for such instruction that these classes are meeting with good success. A woodworking class is also being formed, having at its head one of the best woodworkers in the city.

The report is given, with regret, of the death of Mr. J. H. Pullen, a much respected and esteemed painting contractor, who for many years has done business in the city. His son, J. H. Pullen, will carry on the business at the old stand on Horsefield street.

Mr. Ernest Fairweather, architect, of this city, has gone to Boston and New York on a business and holiday trip.

ST. JOHN, N. B., Oct. 9th, 1897.

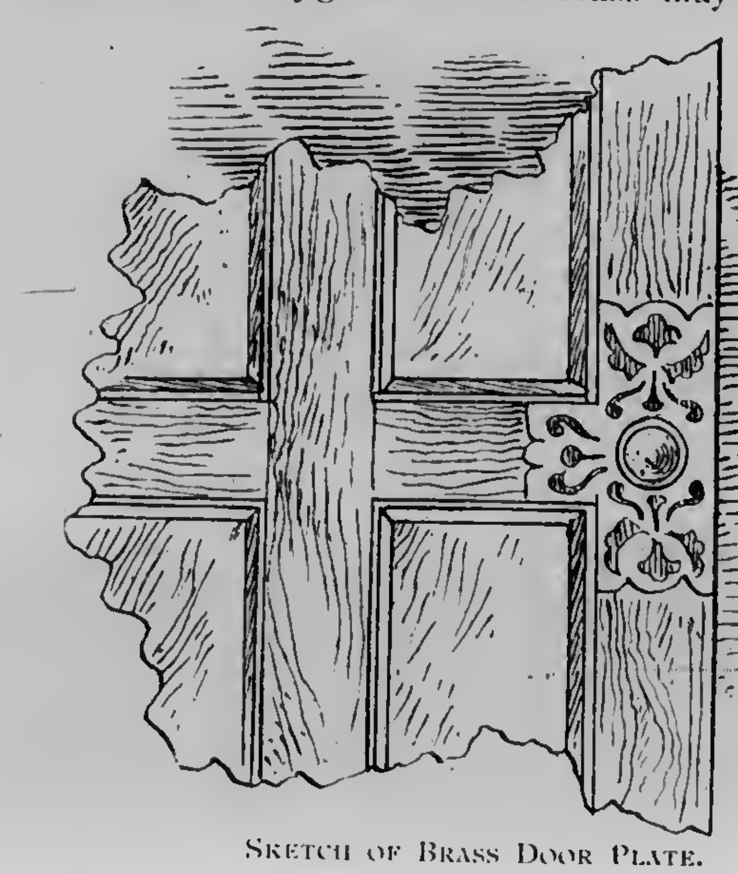
THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Repairing Old Plastered Work. LAST month we made some quotations from Millar's new work on "Plaster and Plastering," of a practical kind. We follow up these with more of the same nature: "When repairing or making additions to old plaster work, care should be observed in cutting the joints, so that the key of the existing work is not injured or broken. The joints one way should be cut on the studding or joists, and in a line with the laths the other way. A joint at the edge of a lath is stronger than at the centre. If the lath work is weak, the joints should be cut diagonally. Never use a hammer to cut joints on lath work, for the repeated impacts will weaken and crack the old work. If the old plaster is hard, cut the joint with a saw, or with a hammer and chisel, and finish with a strong knife. Avoid acute angles in patches; square, round or oval patches not only look better, but are much stronger than zig-zag ones. Having cut the joints neat and square on edge, and then repaired the old lath work, brush the joints and the laths with a dry broom, and then wet the joints, but only damp the lath work, as excessive water tends to warp the laths. The joints are sometimes painted to prevent damp from extending to the old work, or causing injury to any surface decoration. Gauged coarse stuff is generally used for weighing out, and gauged putty for finishing ordinary work. The coarse stuff is generally gauged with coarse plaster. For small patches, the whole thickness is generally brought out in one coat, but for large patches it is best to lay a first coat and then scratch it in the usual way. If time permits, this should stand for one day, or even two, to allow the lath work to settle. The stronger and stiffer the gauge, the less power the lath will have to warp. The floating coat is gauged moderately stiff with coarse plaster, or with fine plaster and coarse in equal proportions. When laid the surface is ruled in with a straight-edge, keeping it within the line of the old work to allow for plaster swelling, and a thickness of 1-16th inch for the finishing coat. It is often necessary to drag the surface down to allow the finishing coat to be ruled fair and flush with the old work. The surface should be left fair but rough. Gauged work should never be scoured, as it only kills the plaster, and therefore weakens the body of the material. The putty for the final coat should be gauged with fine plaster and a little size water. After being laid, the surface is ruled flush with the old work, and when firm it should be smartly trowelled off, and finally finished with a semi-wet brush. The joints should be trowelled flush and smooth, and the old part brushed to free it from any gauged stuff. All rubbish should be damped as it falls and removed as soon as possible, to prevent further dust and dirt. Parian or other white cements are used for best work, or where time is a consideration. All white cements having plaster for their basis are manufactured to be non-effervescent, non-porous, durable, free from liability to unequal shrinkage (which causes cracks), and free in working. They form admirable materials for repairs or additions. When making good old or broken lime plaster work with any of these cements, the joints and lath nails must be painted with red-lead, quick-drying paint or with shellac. Galvanized nails ought to be used for the lath work where these cements are used. Small holes and cracks are usually stopped with fine plaster gauged with putty, or better still, putty water. Parian cement is also used for a similar purpose. The holes and cracks should be brushed with Parian solution before the stiff Parian is applied. This solution is simply fine Parisian gauged to a thin creamy consistency with water. New or damp lime-plastered walls can be painted or papered much sooner, and with greater safety, if brushed with a thin Parian solution. It is also useful for stopping the suction on dry floating and fibrous slabs before laying the final coat. Several new patent plaster and white cements are well adapted for repairs or where time is limited." Canadian plasterers will find much in the foregoing that is useful, instructive and money-making.

Cracked Plaster Work. QUOTING again, we get the following: "Cracks in plaster work are due to various causes. They may act individually or in combination. Cracks are often caused by settlement in the building. These cracks may be easily discerned by their breadth, depth and length. They also arise from the shrinkage of bad or unseasoned timber used in construction or framing of the building, which may cause displacement in the joists or the laths. Other causes are the too sudden drying of the work; strong winds, or heat; the laying of one coat of mortar on another coat, or on walls that have a strong suction, which absorbs the moisture or 'life' of the coat being laid, when it becomes short or crumbly, scaly, and apt to peel or fall off. In this last case it does not set, but only dries and shrinks, which gives rise to cracks, and eventually falls or crumbles away. The use of bad materials, insufficient use of lime and hair, or scamping of labor is often followed by cracks. Insufficient labor and unskilled workmanship in the application of the materials is a great source of trouble, but it will be understood that the best quality of labor will not make bad materials good and strong; and, on the other hand, the best materials will not compensate for bad labor. It is only by judicious selection of materials, and their skilful manipulation, that a high and enduring class of work can be obtained."

Door Plates. No doubt every person has noticed on a door much in use that at one spot just about the door-knob the paint has been worn off, or is blackened and soiled by the continual contact of the hand in opening or closing the door. A number of devices have been tried to remedy this trouble, but few of them have ever lasted long enough to establish a reputation. Some housewives paint the stile of the door for about fourteen inches in length, and the rail for three or four inches in length, with good lamp-black paint and linseed oil. But the trouble with this is that for a short time it hides the dirt, but, when it wears off, it leaves the door in a worse predicament than ever, and it does soon wear off. Iron plates have been tried, and they do fairly well but are unsightly, and though blackened by the Barff process, the black wears off and the iron rusts. So far, nothing answers as well as brass, either silver plated, or nickel plated, or better still, left in its native state. The sketch shown herewith illustrates a brass door plate, through which the spindle of the door knob goes. This is made of sheet brass, and can be made by any clever workman who has access to an ordinary scroll saw, or jig saw. The brass may be about 18



SKETCH OF BRASS DOOR PLATE.

gauge, and the saw should have very fine teeth, not less than twenty to the inch. Holes for round-headed screws and to insert the saw should be drilled through the plate before the sawing is commenced. A good way to work them out is to saw two at a time, and to place them between two thin pieces of wood, paste the pattern on the top piece of wood and follow the lines, sawing through the whole four thicknesses at once. This makes a very handsome plate and will protect the door for a whole life-time. Enough screws should be put in to hold the brass firmly to the door. It may be polished with a little fine emery rubbed on with a cloth moistened in sweet oil, after which rubbing with rotten stone and water will give the brass a fine soft polish; and an occasional rubbing will keep the brass in apple-pie order.

Hanging Sashes. THERE is no reason why a sash should not be so hung that the slightest touch of the hand will move it to the desired position, and yet have it fitted so close that it will not chatter with the wind or allow a gale to enter the room. One of the reasons that sashes do not work well is, that when the frames are made, sufficient care is not taken to make the pulley stile straight and true on the face. Often these are left hollow in the centre; then the sash must be made wider at the meeting rail than it is at the bottom or the top rail; if it is to fit snug. This being the case, it is impossible for the sashes to slide either up or down, so the workman is compelled to narrow the sashes at the meeting rail in order to allow them to slide, and the consequence is that a certain amount of playroom obtains between the sash and the jamb at the meeting rails, which is sure to cause rattling at that point when the wind blows on that side of the house. To make a good tight window, and one in which the sashes move easily, the pulley stiles should be straight and parallel to each other. Another condition that must be complied with to insure satisfactory results is, that there must be as little "play" as possible between the sashes and the stops. A rough workman will leave from 3-32 of an inch to ⅛ of an inch play, in order, as he imagines, to allow for the space required for five or six coats of paint, and this leaves lots of room for "rattle." One-sixteenth of an inch space between side of stile of sash and stop is ample, and more, to allow for paint. A good painter does not besmear his work, but puts on his paint so deftly that it would require fully one hundred coats to make an inch in thickness; hence, six one-hundredths of an inch would be all the space required to enable the sash to move with freedom in its frame. Sometimes window frames are forced out of shape after they are "set" in the walls. If the building is a frame one, the siding or other covering is cut in too tight against the casings, and this is apt to force the middle of the frame inwards, making the pulley stile convex or winding on the sash side. When this occurs, it becomes next to impossible to make the sashes slide easily in their frames, for the lower part of the lower sheet will be wider than at the meeting rail if it fits snug, and it would be impossible to raise it. This necessitates planing off the lower part of the stiles until the sash is the same width at the bottom as at the meeting rails, a condition that is sure to cause a rattling window. The top sheet, of course, will have to be treated the same as the bottom one, which gives both sheets an opportunity, whenever the wind blows, to play a "rat-a-tat-tat" while the storm lasts, much to the inconvenience of those occupying the room where the window is situated. When sashes have been properly fitted and hung, and the weights and sash lines tested and properly secured, the "pocket" cover should be nicely screwed in place and left with a smooth face, so that the sliding sash will not make any abrasion, or have more friction at the joint, than elsewhere. The pulley axles should be lubricated with graphite, black-lead, or, if this is not available, a little hard mutton tallow should be placed in the axle bearings; this will make them run smooth, or at least smoother than if left without some sort of lubricating matter altogether. The common sash pulleys are poor things at best, and should never be used in good buildings, as they make as much noise when in use as a locomotive running at full speed. The best pulleys in the market are not any too good, as they are made as cheap as they can be turned out, and are rough and untruthful. The best axle pulleys are made in England, but they are costly. The axle is of fine steel, turned true in a lathe, and it runs in brass bearings, and there is a small hole in the stile-plate where a drop of oil may be inserted on the bearings when necessary. When a sash "sticks" in

the frame because of "swelling," or of having too much paint smeared on it or the frame, the trouble may often be cured by rubbing that portion of the frame in which the sash slides with a little moistened soap. Ordinary toilet soap answers the purpose fairly well and has no disagreeable following, but common yellow soap is much better. Fuller's earth may be used, but it is apt to dissolve the paint, and besides, leaves dust and dirt behind. All sashes should have window locks, whether they be situated up or down-stairs. While the main object of a window lock is to keep out interlopers, it has a secondary importance; it should be so arranged as to bring the two meeting rails snug together and hold them in that position, to the exclusion of wind and weather.

Staining Bricks.

It frequently happens that a builder has to build an addition to some brick building already up; and it also happens that he cannot procure bricks to match the old bricks in color. To get over this difficulty he is compelled to use bricks available and render them the color of the old bricks by staining, or staining the old bricks to correspond with the new. There are several methods—all good—of staining bricks, and for the benefit of those builders who may require to employ one or other of the methods, we submit the following: To make a good durable red stain, mix Indian red, or Venetian red, with a solution of good Portland cement, regulating the color by adding a little Spanish brown if necessary. Mix with this fine sand, washed clean and dried, before being added to the solution. Cement and sand may be used in equal proportions. The mixture is to be a little thinner than ordinary paint. It must be stirred while being used, and applied with a brush. Another red stain, which is easily applied, looks better than the first, but lacks durability. Take as follows and in proportion to amount required: One ounce of glue melted in one gallon of water, add a piece of alum the size of an egg, then a half pound of Venetian red, and one pound of Spanish brown. Try the color and mix more light or dark to suit. For a buff or cream color, use any yellow mineral paint, such as yellow ochre, adding a mineral white to make it light if necessary. For black, use asphaltum heated to a fluid state before applying. Bricks should be stained black before being laid, and the best way is to make the brick moderately hot, then dip them about one inch in the melted asphaltum, and leave them to dry before being used. This makes a good durable job, if they are held in the mixture for a moment or two in order that the color may have an opportunity of being absorbed to the depth of a sixteenth of an inch. Another method of staining bricks black is to mix together asphaltum and linseed oil, and heat the mixture until it will mix together well. Heat the bricks and dip them in the mixture, where they should remain for a short time. The best way to stain black is to have a flat pan over a fire; fill the pan until it has about an inch in depth of the mixture. Place in the pan as many bricks as it will hold, then take out the first brick and replace it with another. Put the stained brick on a board or a clean spot to dry; then take out the second brick and put another in its place; and continue this operation until brick enough are stained, minding to keep up the supply of asphalt and oil.

MR. HENRY CLARK.

We have pleasure in publishing the accompanying photo and sketch of Mr. Henry Clark, of Walkerton, Ont., a contractor well known throughout Western Ontario.

The subject of this sketch was born at Portsmouth, England, on the 10th of June, 1843, and is therefore now 54 years of age. After leaving school Mr. Clark followed the trade of ship-joiner at London, England, until the year 1869, when he decided to come to Canada. After visiting several towns on his arrival in this country, he settled in Galt, engaging in carpenter work and sub-contracting until 1895, when he removed to Walkerton and has since been engaged in building in that place and neighboring towns.

Among the many buildings erected by Mr. Clark are St. Paul's church, public school, carpenter work of the Robinson & Rowland block, Merchant's bank, English church, Baptist church manse, and a number of residences and stores in Walkerton. Mr. Clark has just

Mr. Henry Clark.

completed the erection of a new factory building for the Walkerton Chair Factory Co., and is now on the new town hall at Walkerton, for which he has the contract.

Mr. Clark takes an active interest in municipal matters, and has been elected as alderman for his town for several terms.

THE PROPER CONSTRUCTION OF ICE HOUSES.

The committee appointed by the Association of Railway Superintendents of Bridges and Buildings of the United States to report upon the best method of constructing ice houses, make the following recommendations: In all ice house construction the most important consideration is the

Insulation.—The ideal ice house is simply a storage chamber, absolutely protected on all sides against the absorption of external heat and supplied with well designed drains for the prompt removal of all water resulting from the little melting that, in spite of all precautions, will occur. Heat travels or is conveyed by radiation, conduction and convection. For the purposes of this discussion the outside of the building and the ground (however themselves heated) may be assumed to be the source of the heat against which it is desired to insulate the storage chamber. Experiment has shown that cells or small chambers of dry, dead air form the best insulator. In the proportioning of these

air-spaces two facts must be borne in mind, (1) the intensity of radiant heat varies inversely as the square of the distance from the source and (2) soon as a current, however slight, of air is formed in any air space, heat is carried by convection around in that chamber. Of course two air spaces are more effective than one, and three more than two, but there is an economic maximum dependent on the circumstances of each case.

Material of Construction.—Wood is best adapted for use in buildings of this character, being itself a non-conductor of heat, and not retaining the heat as does either natural or artificial stone, it permits the cheapest and at the same time the most efficient construction. In some municipalities certain regulations have been established governing the construction of all buildings within the "fire limits" and such laws usually are directed first to the material of construction; at such a point it will be well to consider the advisability of locating the proposed ice house beyond these fire limits to conserve the use of wood in the construction.

Plan.—All ice houses should be built in sections, the size of section being governed by the quantity of ice used; in some cases it is advisable to construct across each section lateral partitions which will still further reduce the amount of ice exposed to contact with the outer air while part of the stock is being removed. At the centre of each section and at about the level of the first door should be placed a platform, say 6 x 10.

Proportions.—Assuming that a cubic foot of ice weighs 57.2 lbs., a ton of solid ice would occupy about 35 cubic feet. Some years since, 40 cubic feet were considered ample in which to store a ton of ice cut in such sized cakes as are usually stored, but that allowance has been increased to 45 and even 50 cubic feet. Any organic matter, such as that generally employed—hay or sawdust—not only dirties the ice, but being dampened by the melting, soon begins to rot, decompose, and become foul. For this reason the use of any organic matter between walls is to be deprecated. The use of short fibre asbestos in the outer air space has been suggested, but not to our knowledge tried; however, at a weight of 12 lbs. per cubic foot and at a cost of $16 per ton in car load lots, f.o.b. New York, the expense is practically prohibitory. This asbestos, if used loosely, as it should be if used at all, settles after being wet, and though it still retains its spongy character, is reduced in volume, leaving the upper portion of its confining chamber empty.

Site.—While little scope is usually given in the selection of a site there are certain precautions to be taken in order to secure a good bed. If the site chosen be on a little rise above the adjacent ground level, surface drainage will give no trouble; otherwise, provision for it, as well as for the water from the melting ice, must be made.

Preparation for the Bed.—Assuming the ground to be good, the excavation below frost line is made for the house foundations, and about two feet in depth inside the foundation for the reception of the bed. If the digging shows a clay soil, drains should be provided to carry off the water from the ice, and these drains should be air-trapped.

Cinders or gravel should then be placed in the excavation, as a bed whose top should be raised slightly above the surrounding ground level and inclined with an easy and gradual slope to the centre. On this bed, before ice is stored, rough hemlock plank should be laid with, say two-inch spacing to keep the ice off the bed itself, yet permit the water to pass through readily. A good concrete floor, well drained from the centre, would make a better job and be more satisfactory, but its cost precludes its general use in construction of this class.

Foundations.—The foundations also, whether of wood, brick or stone, should contain an air space as a further insulation; heat may reach the storage chamber as well under as through the walls; in some cases this, we know, is the case.

Construction.—It is claimed by some that the side walls should be constructed with a batter, but your committee do not approve this idea; the idea is evidently to relieve the side walls of any pressure that may be brought upon them by the spreading of the mass of ice as it melts, but if the slightest care has been exercised in the storing of the stock, that condition will not be found to exist, especially as the ice naturally melts most on the outside of the mass; at any rate, in order to be effective, assuming such a condition to exist, the batter would have to be increased over any we have yet heard proposed.

If considered necessary, to resist wind pressure, etc., the sills may be tied to the foundation. They should, on a brick or stone foundation, be laid in a lime mortar in any event. The sheathing, with the exception of the outside, may be rough. While there will be three extra courses of this rough sheathing over what is usually found, the lumber is cheap and the results obtainable will fully warrant the slight increase in cost.

The paper used should be saturated (not painted or coated) and laid with laps to the centre of the sheet, virtually giving, then, two thicknesses of the paper in each lining. The sheets should be well cemented together, and the paper tacked securely to the sheathing. A paper similar in character to the "Giant" of the Standard Paint Co. is recommended, which running, say 80 to 85 lbs. per roll of 36 inches width, and containing 1,000 square feet, will cost about $6.25 per roll in place, including cement and tacks. With this paper should be used a cement similar to that used for roofing purposes, which must be flexible (not brittle), strong, inodorous, and lasting. The job, when properly done, will make each space air and water-tight. The construction here recommended is the best practice of commercial cold-storage houses, only so modified as to be cheap to construct, while yet retaining practically all the advantages of a more expensive construction.

At each gable end ample ventilators should be placed, permitting a free and full current of air over the ceiling of the storage chamber. The roof should be shingled and the valleys between sections well lined. There is nothing, apparently, gained by having the doors, through which to handle the ice, vertically continuous. A stiffer frame, freedom from excessive sag of the lower doors, and a closer, tighter fit of each door are secured by introducing a stiff sill framed under each door.

As may be inferred from the foregoing, we do not approve the use of tie-rods to "stay" the sides of the sections, because of their unreliability; they must of necessity sag under the weight of the superimposed ice, and then they either spring the side walls in, or, because of the low temperature and tension to which they are subjected, break; even in the latter event they spring the side walls more or less before they let go.

A rigging amply stayed should be located over each

line of doors to take the hook of the pulley for the hoisting rope in handling the ice in and out of the house.

A couple of coats of a good, light-colored, zinc paint should be applied to the outside of the house.

MANUFACTURES AND MATERIALS

The Sackville Machine & Foundry Co., Ltd., has recently been incorporated at Sackville, N. B., to make water works supplies, hardware, etc.

Negotiations are in progress with the object of consolidating the various potteries at St. Johns, Que., and to carry on the business as one concern on a large scale.

The Winnipeg Heater Company, of Toronto, Limited, has lately been granted incorporation with a capital stock of $24,000, to manufacture heaters, fuel burners, radiators, etc.

The Dominion Granite Co., owners of black and red granite at Welsford, N. B., and Shelburne, Nova Scotia, are shipping large quantities of this material to Scotland, where a large demand has developed.

The Toronto Paving Brick Company, Limited, has recently been granted a charter. Its capital stock is $90,000. The promoters are: Messrs. A. E. Ames, Joseph Kilgour, A. A. McMichael, Wm. Crawford and J. B. Noble.

A deposit of black granite is reported to have been found at Welsford, Nova Scotia. A Bridgwater firm is said to have acquired the property, and will erect polishing works, for the operation of which there exists an excellent water power.

The Owen Sound Portland Cement Co. are installing in their works at Shallow Lake an electric lighting plant, that they may be enabled to operate both day and night. This is a gratifying evidence of the growth of the demand for the company's product.

Mr. Bartholomew, president of the British syndicate which purchased the asbestos mine at Danville, Que., recently paid a visit of inspection to the property, and is reported to be extremely well satisfied with the investment. Upwards of half a million dollars have been expended in plant and machinery during the past four months. Asbestic, the new building material obtained from these mines, is arousing considerable interest and favorable comment in Great Britain and the United States, as well as in Canada.

Messrs. Gibson, Stuart & Hanson, owners of the Bocabec black granite quarries at St. George, N. B., are said to have given an option of purchase to an American company, of New Britain, Conn. A representative of this firm, Mr. H. Oldershaw, recently visited the quarry and expressed himself favorably regarding the adaptability of the stone for polishing and manufacture into slabs for the interior decoration of buildings as well as monumental work. If the sale should be consummated the purchasers will erect polishing works.

F. Hilliard, Renfrew, Ont., is erecting a tile kiln in connection with his brickyard.

The master plumbers of St. Thomas, Ont., have recently organized an association, the officers of which are as follows: President, J. Flaherty; vice-president, J. Williams; secretary-treasurer, J. Stacey.

In graining doors, when knotted oak is required, which is generally done on the panels, the knots are put in with a fitch or tool, and sweeps of light shades encircling and running from the clusters of knots; then a finer kind of veining and growth is put in. This style makes a very handsome door when properly done, and gives a good deal of license to the fancy of the grainer in producing varied effects.

Paper pulp can be used very advantageously in stopping cracks. It should be kept in a close stoppered bottle, in order that the moisture may not evaporate. When required for use make it of the consistency of thin gruel, with hot water; add plaster of Paris to make it slightly pasty, and use at once. Mixed with glue, and either plaster of Paris or Portland cement, paper pulp is the best thing to stop cracks and breaks in wood. Paper pulp and fine sawdust, boiled together for hours and mixed with glue dissolved in linseed oil, makes a perfect filling for cracks in floors. It may be put on and left until partly dry, then covered with paraffin and smoothed with a hot iron.

THE TECHNICAL TRADE JOURNAL AS AN EDUCATOR.

The value of a well-conducted trade journal to a man who is engaged in the industry represented by that publication cannot be over-rated, writes Mr. Thos. P. Pemberton in the Master Steam Fitter. Nearly all trade papers, as the term is understood, are more or less technical in character, giving information not only of the general condition of special industries, but also of the changes and improvements made by manufacturers in design, process and construction. When these can be presented to readers by means of outline drawings and finished engravings the usefulness of the trade paper is still further increased. The daily newspapers pay little attention to the multitudinous details which are of interest to manufacturers. They may announce new inventions, the erection of large works, peculiarities in mechanism and operation, or great scientific discoveries, and these, undoubtedly, interest general readers and satisfy the public mind in its eagerness to know, at least, something of all current developments and events. But when the manufacturer desires minute information regarding his own special industry, he has recourse to technical and trade journals, which give him information of what others are doing and how they are doing it. The industrial press, when it performs its functions properly, does precisely that which the daily press leaves undone. In saying this we do not forget the wonderful enterprise of some of our large American dailies in giving illustrated descriptions of many new inventions and discoveries, but these, however satisfactory for general readers, are incomplete for manufacturers who may be particularly interested in all the details of design, construction and operation.

But how is the technical trade paper an educator? Its mission and purpose are, in its successive issues, to cover the whole ground and to confine its information to the particular field in which it operates. It reports and explains many new processes, whether they be developed at home or abroad; it illustrates and describes important new machines and apparatus; it records the progress of invention and improvement in different branches of industrial art and applied science; it announces what is being made and sold; the organization of new firms; the award of contracts; the construction and operation of large plants; and gives special information on special subjects for manufacturers of specific articles. All this and much more is in the routine and absolute requirements of business education.

The advertising pages in such a journal are not a mere dreary and uninviting series of puffs and boastings. They are an illustrated catalogue and chronicle of the supplies which are required in particular branches of industry. They indicate the most advanced state of ingenuity; they present to the eye and the mind qualities and forms; they tempt the manufacturer and the consumer, as a matter of self interest, to examine them. Those who do not examine them exclude themselves from information for which, if they comprehended their own interests, they would be willing to pay handsomely.

Trade journalism in this country has acquired dignity and importance; and in this field, as in all others, popularity, success and rapid growth are the portion of journals which prove their possession of brains, enterprise and sincere devotion to the interests of which they are representatives. They are educating mediums for the advancement of civilization, the progress of commercial enterprise, manufacturing industry and mechanical ingenuity. They are the exponents of taste, design and utility, and an inestimable benefit to producers and consumers, to both employer and the employed.

A new bridge over the Danube at Czernavoda is now the longest in the world, its length being 13,325 feet to 10,725 feet of the Tay bridge. The widest span is 620 feet wide, and there are two others of 455 feet.

Varnish to Protect Polished Metals from Rusting. Dr. C. Puscher recommends the use of a solution of paraffin in petroleum (1 part by weight of 3 in petroleum), as a varnish which may be usefully applied to polished metals, especially as after having brushed this liquid over the surface of this metal it may be gently wiped clean with a soft piece of flannel, so as to leave only a very thin film of the varnish, yet sufficient for the protection of the polish.

HOW TO MAKE ELEVATORS SAFE.

The margin of safety demanded in elevators is, naturally, very generous, and there are various forms of safety clutches, many of them automatic in their action, but experience goes to show that none of these can be a full substitute for the air cushion in the pit. The action of this device in insuring safety is almost magical. In some experiments made in a lofty store in New York, the lift was taken to the top of the building and allowed to fall with the brake off. A writer in "Scribner's Monthly" says it fell to the top of the pit with tremendous force, and struck the cushion of air with a sound as if it had struck soft earth. It seemed to stop suddenly at the top of the pit and then slowly settled down to the bottom. It was clear that the pit was too small at the top; that the slope of the sides was too slight; that if the escape of air had been freer at the impact the stopping would have been sensibly gradual. The stop was really gradual, as was shown by the fact that a half-dozen eggs in a paper bag, that had been laid on the elevator floor, survived the fall without injury. As a reserve against any possible failure of the other safety appliances, this seems an expedient worthy of imitation. Its presence would conduce to a feeling of perfect security on the part of timid people who have sometimes to use these elevators.

Mr. George Grant, contractor, Arnprior, has completed the erection of the new two-story brick public school in that town.

Mr. Sidney Pomeroy, Orillia, has now thoroughly refitted the planing mill he lately added to his building and contracting business.

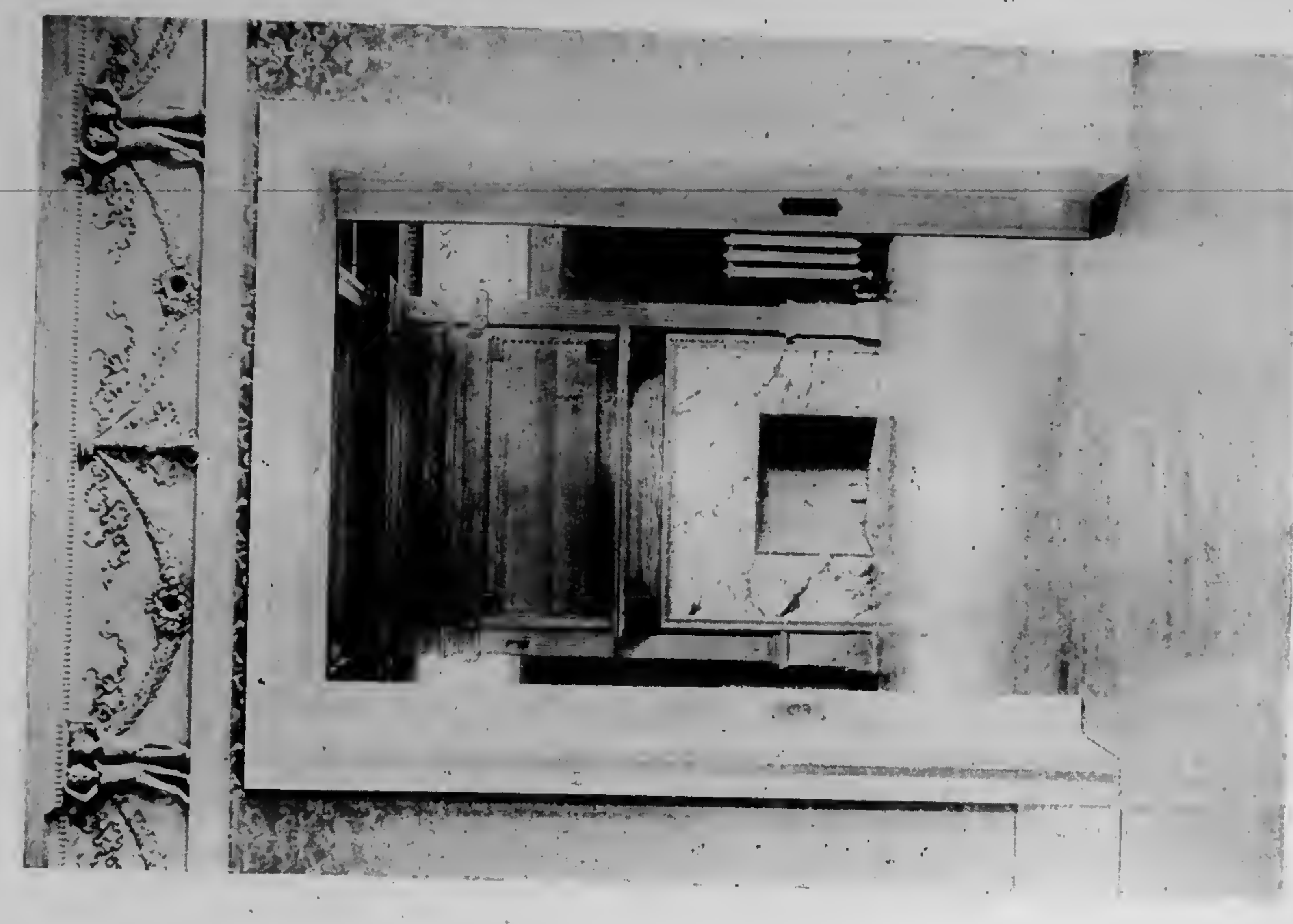
Mr. F. E. Fortier, of Pembroke, who has the contract for the erection of the new post office at Arnprior, has the building nearly ready for the roof. This handsome building will greatly add to the appearance of the main street of the town.

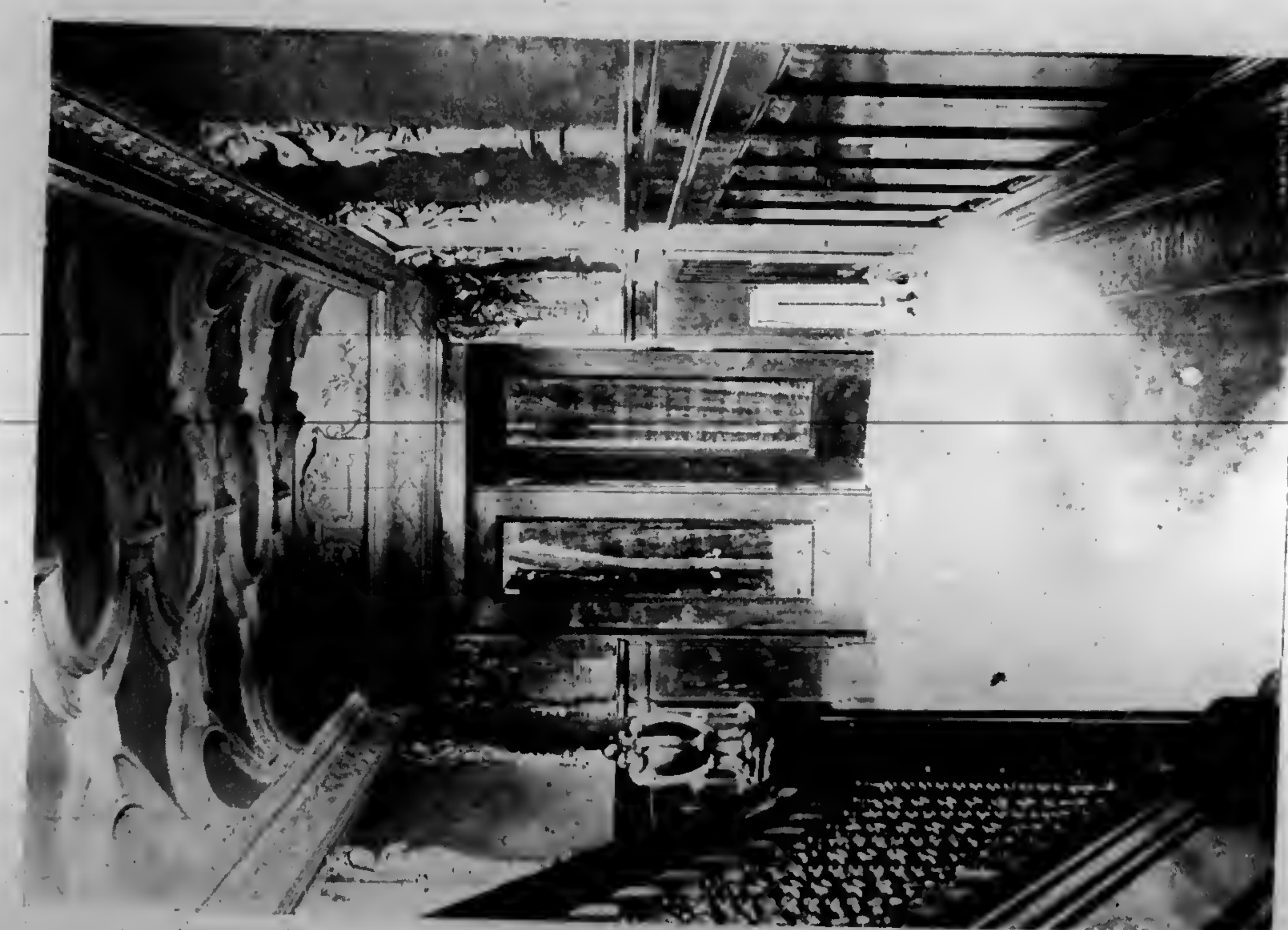
The Owen Sound Portland Cement Co., of Shallow Lake, have purchased an electric plant from the Royal Electric Co., and will have the same operating in a very short time. It is their intention to work twenty-four hours per day during the season.

At the annual meeting of the Hamilton Art Students' League, held recently, the following officers were elected: President, Mr. J. R. Seavey; vice-president, Miss Clara Galbraith; secretary-treasurer, Mr. H. L. Wright; board of control, Messrs J. S. Gordon, A. H. H. Hemming, Wm. Marshall, Miss Rose Baine, Miss Galbraith, S. L. Wright, J. R. Seavey.

Messrs. William & Walter Stewart, architects, of Hamilton, have under construction a new building for the Sun Life Assurance Co., on the site of the old post-office building. A considerable amount of the stone belonging to the old building is being employed in the new, but the material has been so nicely cleaned that an observer would have no idea that it had previously been in use.

Sir Wilfred Laurier laid the corner stone of the new St. Luke's hospital at Ottawa a few days ago. The building was designed by Mr. E. L. Horwood, a local architect. The dimensions are, 230 feet in length, 75 feet in depth and 85 feet in height. The structure will be made as nearly fireproof as possible. It will be lighted by electricity and heated by steam and hot air. It will ultimately provide accommodation for 120 patients. The present building provides accommodation for about 65 patients. The same architect has been commissioned to erect a building on the corner of Bank and Sparks street for the Sun Life Assurance Co. The building is designed in the Italian renaissance style, the lower story being constructed of Miramichi green and New Brunswick red sandstone in alternating courses. The upper portion of the building is of buff pressed brick, ornamented with terra cotta. The northeast corner is rounded and surmounted by a copper dome supporting a globe and a figure of Mercury, which is mounted on ball bearings so as to act as a weather vane. It is intended to make the structure absolutely fireproof, the construction being of steel covered with porous terra cotta.





INTERIOR VIEWS IN RESIDENCE OF MR. M. J. HANEY, ROSEDALE, TORONTO.

ERNEST R. ROLPH, ARCHITECT.

CANADIAN ARCHITECT AND BUILDER.

VOL. X.—NO. 11. NOVEMBER, 1897 PRICE 20 CENTS / $2.00 PER YEAR.

—THE—

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(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Heating Methods in Europe and America. GREATER intensity of cold, a desire for a higher inside temperature due to a dryer atmosphere, and an inclination to save manual labor, are the causes to which the London Builder attributes the practically universal abandonment in America of the open fire place, as a warmth producer and distributor. While maintaining that the European method is scientifically correct, our contemporary is nevertheless led to admit that "Even in England, the efficiency of the open fire is limited and its costliness considerable; therefore we may with advantage take cognizance of the results and the experimental efforts of our inventive rivals." That this opinion is making rapid headway in Europe is proven by the increased demand for Canadian heating appliances—the growth of which demand has led to the establishing of agencies for the goods in all the leading cities of Great Britain and the continent.

Co-operation of Architects and Engineers. IN connection with the erection of modern large buildings in which structural iron and steel are largely employed, it is no unusual thing for the architect to associate with himself a civil engineer whose education has been such as to qualify him to assist in solving the many structural problems incident to the use of new materials. In New York and Chicago, engineering experts have found, in connection with the erection of numerous gigantic architectural steel constructions, a new and profitable field for their services. In consequence, the question has to some extent been seriously discussed, whether, ere many years shall have passed, the architect may not find his occupation gone. To those, however, who have given the subject proper consideration, it is easily apparent that the architect is in no danger of being supplanted by the engineer. The latter has quite enough to do to qualify himself to deal with the many and complex problems of a profession the scope of which has greatly widened during the last decade. On the other hand, there is a possibility that the architect may be called on to advise and assist the engineer to so design his structures as that they shall present a pleasing and artistic appearance. A recent article in the Engineering Record, pointing to the necessity of the aesthetic element in the design of engineering structures, says: "To design work of this character, it is true, involves the exercise of powers acquired through a somewhat broader training than engineers usually enjoy at this time, and that fact indicates two proced-

ures necessary to remedy the professional defect, one of which is the association of a qualified architect with the engineer on large works, and the other is such an extension of the engineer's educational training as will supply him, if possible, with the necessary artistic discrimination. It will probably be a long time before the second method is pursued to any considerable extent, for the curriculum of engineering study is sufficiently full already, but the procedure first named is at once available. While it is exceedingly rare that an architect and an engineer are associated for this purpose in works of construction, there is no reason whatever why they should not be, and there are many good reasons why they should be so associated in works of great magnitude. Such works involve the expenditure of large sums of money; they are usually of a monumental character, and frequently are located where they become objects of public sight. In not a few cases they may add beauty and dignity to the landscape or irretrievably mar it."

The Law of Light. A RECENT decision by Lord Justice Lindley, of the British Court of Appeal, serves to clarify the legal interpretation of the law on this subject. While affirming the generally accepted principle that a grantor may not derogate from his own grant, that is to say, in the case of the sale of a house, a vendor may not afterwards, if he owns the adjoining land, obstruct the lights of the house which he has sold, the Lord Justice made reference to cases to prove that the right may in particular cases be modified or limited. In the present instance, however, while the defendant was able to show that the plaintiff knew that houses were to be built on adjoining land, he was not able to show that there was any understanding that the lights of the house sold were to be seriously obstructed; on the contrary, it was shown that the defendant had built higher and closer than was in contemplation. The result of the case is, therefore, that the mere fact of a purchaser knowing that adjoining land will be ultimately built on does not constitute acquiescence in a future obstruction.

A Curious Method of Construction. A CURIOUS method of construction, which is said to have been much in use in Ireland upwards of a century ago, came to light recently in connection with the attempt to straighten the spire of a church in the county of Cork. After the spire had been examined by an architect, and the contractors had set about taking it down, with the view of rebuilding, the surprising discovery was made that it could not be taken down except it was done en masse, as the stones of which it is built were hermetically bound to each other with a combination of molten lead and sand, which rendered it absolutely impossible to separate one stone from another, the whole spire being, as it were, one solid block. On further and closer inspection it was found that the entire building was erected in a similar manner, no other mortar or binding substances of any kind being used save the sand and molten lead. A huge iron shaft runs through the top portion of the spire, on which the stones were slipped like rings and irrevocably rivetted with lead and sand. Under this extraordinary circumstance the idea of taking down the tower had to be abandoned, as being quite impracticable, if not utterly impossible, but the desired end is said to have been satisfactorily attained by an ingenious and clever method adopted by the contractor and his staff, particulars of which are unfortunately not supplied.

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ESTHETIC VALUE OF MOULDING AND PROFILE.*

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THE moulding is, without doubt, one of the most necessary details of architecture. It is the prime ornamental feature which appears at the origin of art. At the outset, simple chamfer, fillet or bead, it has grown into more definite and refined forms with the development of the styles. Did it appear at the beginning principally as a useful accessory or as a purely ornamental detail? This I will not attempt to say, but a thing certain is that it admirably fulfils both functions in all known styles. I will not lay stress on its utility or even necessity: I shall content myself, in these brief notes, with a rapid and incomplete review of the evolution of moulding and profile as they appear on the monuments of different ages.

As an element of style, it possesses a prime importance, and nothing can take its place with advantage, not even the most refined and architectural carving. A structure all covered with carving, without any other element of architecture, cannot easily be conceived, while many monuments exclusively ornamented with mouldings are quite satisfactory, and easily suffer the lack of carving sculpture—in fact, the style and age of a monument can be more easily detected solely by the aspect of any of its mouldings than by any other detail.

The shape of the moulding is not arbitrary in any style; it follows the fluctation of the style; it bears analogy to the other details which constitute a style. It is scarce and thin in some of the styles, rich and frequent in others; it has definite forms, whether situated at the base or at the crowning of a building. At all advanced periods, artists have given particular attention to the effect of light and shade, of softness, lightness, sharpness of mouldings.

Let us consider what are known as the historic styles of architecture, and the value given to mouldings, in accordance with the degree of artistic culture acquired by the nations, and also according to the individual tastes of the artists and the expression they wished to imprint upon their works.

We shall pass by primordial epochs, which would take too much of our attention with researches more curious than useful, and rapidly pass in review the most renowned architectural periods.

The mouldings in Egyptian architecture offer little variety in their forms. A plain bead usually ornates the angles of buildings, and frames the several panels filled with hieroglyphics; a listel, a large cavetto and plinth make the crowning part to almost all the monuments actually known. But the least initiated feels the intention of the artist to give a definite aspect to his buildings, by the especial disposition and form of his mouldings.

The Greek architecture is far more expressive in its marvellous examples. One is struck by the infinite care and attention given to each moulding and profile. I take at random a parallel of a few Doric capitals (Fig. 1), covering about the whole period of the development of the Doric order of architecture, which will serve to emphasize the admirable care, study and research brought to bear upon the composition of mouldings and the importance given to that detail of architecture. The monument of Lysicrates (Figs. 3 and 5) is another striking example of refinement in the composition of profiles. The profile of the monument as a whole shows how well each value, if I may so call it, is placed. How well balanced are the first steps springing from the ground, and giving a basis quite satisfactory for the most critical eye. The cornice of the stylobate comes after, with its forms, still strong and rather massive, but as a transition leading to the delicate columns. The bases of these columns, the simple profiles of the capitals, and the admirable entablature, stand as perfect models and as a reproach to our haggard profiles and mouldings, lacking not only in taste, but being too often placed without reference to convenience and common sense. Examples might be multiplied in Greek architecture only, which has never been surpassed for grace and perfection of all its parts. I will only refer to a few details of the Erecteion (Figs. 2 and 5); they speak for themselves with an eloquence I am unable to describe.

The Roman architecture offers some good models of mouldings, but they are inferior to those of the Greek orders, from which they are derived. They are lacking in character, and very often are without refinement. Compare, for instance, the profiles of the Roman adaptation of the Doric order, with all its curves drawn with the compass, to the Greek order, with its swelling and studied forms, full of refinement, and showing a persistent aspiration towards ideal beauty.

The first Romanesque period, in its clumsy profiles and mouldings, its inert masses of materials, exhibits a confusion of ideas which has its parallel only in our confused times, and more especially in America.

That barbaric period, the offspring of anarchy and confusion, is followed by another, still Romanesque, but more homonogeneous, the mouldings of which attain a great perfection and diversity—Romanesque of the eleventh, twelfth, and part of the thirteenth centuries, of which Figs. 11 to 13 give an idea.

From this period to the end of the last century the form and expression of moulding follows a definite and normal evolution, in this, that its forms are constantly controlled and studied. It is, without doubt, massive and superfluous—I was about to say heavy—with the beginning of the mediæval period, and becomes more delicate, even meagre and scarce in some instances, but it always possesses expression, movement, and is expressive of skill and ingenuity. But it loses with the last period many of its useful characteristics, for which reason greater value attaches to the architecture of preceding epochs (Figs. 15 to 17).

The Renaissance period has chiefly been inspired by the Roman ruins still in existence, but it retains that diversity and boldness derived from medieval periods.

It has devolved upon our times to return to the barbaric confusion of the primitive periods of early Romanesque architecture. The ease with which one can, in our days, style himself an architect, without having any genuine feeling for the art, and having scarcely any knowledge of it, together with the immense quantity of artistic materials, in the shape of pictures, photographs and the like, which is thrown into the hands of everybody, has brought about confusion in the minds of many, causing them to mix mouldings at random as they would do anything else. I lately came across a very bad example of such work, and I cannot resist the temptation to illustrate it by Fig. –, and also give a few models of mouldings designed by modern French architects (Fig. 16).

The study of good profiles and mouldings, outside of any other details of architecture, will well repay the student, assisting him to acquire a power of analysis, which is much required in modern architecture.

* Paper read at the seventh convention of the Province of Quebec Association of Architects. For figures referred to in this paper see illustration sheets.

BY THE WAY.

THE new Female Seminary at Washington, Pa., has been designed by Miss Elsie Mercur, of Pittsburgh. The contractor is also a woman, Mrs. Clara Meade, of Chicago. There will be a lively time when women also invade the ranks of the trades unions.

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THERE are in the world persons so dull-witted or lacking in sensitiveness that sarcasm is thrown away upon them. An amusing illustration of this has just transpired in England. With the object of putting a check upon vandalism, the authorities at Darston Head had placed at the entrance to an enclosure containing antiquities, two stone slabs, bearing this inscription: "Persons who are anxious to write their names will please do so on this stone." A number of persons accepted the invitation in good faith, and forthwith proceeded to inscribe their names.

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A PECULIAR occurrence, and one which by fortunate chance, did not result in heavy destruction of life, took place on Sept. 13th last at the newly opened quarries at Windmill Point, Ont., from which the stone is being obtained for the new breakwater at Buffalo. During a thunder storm the guy ropes supporting the derricks served as lightning conductors. At the junction of two ropes the lightning went to earth. One of the six holes, charged with about five pounds of explosive, happened to be directly in the course of the electric current, and was discharged in the midst of a large staff of workmen. Fortunately the other pockets were not discharged, and nobody was hurt.

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As an element of style, it possesses a prime importance, and nothing can take its place with advantage, not even the most refined and architectural carving. A structure all covered with carving, without any other element of architecture, cannot easily be conceived, while many monuments exclusively ornamented with mouldings are quite satisfactory, and easily suffer the lack of carving sculpture—in fact, the style and age of a monument can be more easily detected solely by the aspect of any of its mouldings than by any other detail.

The shape of the moulding is not arbitrary in any style; it follows the fluctation of the style; it bears analogy to the other details which constitute a style. It is scarce and thin in some of the styles, rich and frequent in others; it has definite forms, whether situated at the base or at the crowning of a building. At all advanced periods, artists have given particular attention to the effect of light and shade, of softness, lightness, sharpness of mouldings.

Let us consider what are known as the historic styles of architecture, and the value given to mouldings, in accordance with the degree of artistic culture acquired by the nations, and also according to the individual tastes of the artists and the expression they wished to imprint upon their works.

We shall pass by primordial epochs, which would take too much of our attention with researches more curious than useful, and rapidly pass in review the most renowned architectural periods.

The mouldings in Egyptian architecture offer little variety in their forms. A plain bead usually ornates the angles of buildings, and frames the several panels filled with hieroglyphics; a listel, a large cavetto and plinth make the crowning part to almost all the monuments actually known. But the least initiated feels the intention of the artist to give a definite aspect to his buildings, by the especial disposition and form of his mouldings.

The Greek architecture is far more expressive in its marvellous examples. One is struck by the infinite care and attention given to each moulding and profile. I take at random a parallel of a few Doric capitals (Fig. 1), covering about the whole period of the development of the Doric order of architecture, which will serve to emphasize the admirable care, study and research brought to bear upon the composition of mouldings and the importance given to that detail of architecture. The monument of Lysicrates (Figs. 3 and 5) is another striking example of refinement in the composition of profiles. The profile of the monument as a whole shows how well each value, if I may so call it, is placed. How well balanced are the first steps springing from the ground, and giving a basis quite satisfactory for the most critical eye. The cornice of the stylobate comes after, with its forms, still strong and rather massive, but as a transition leading to the delicate columns. The bases of these columns, the simple profiles of the capitals, and the admirable entablature, stand as perfect models and as a reproach to our baggard profiles and mouldings, lacking not only in taste, but being too often placed without reference to convenience and common sense. Examples might be multiplied in Greek architecture only, which has never been surpassed for grace and perfection of all its parts. I will only refer to a few details of the Erecteion (Figs. 2 and 5); they speak for themselves with an eloquence I am unable to describe.

The Roman architecture offers some good models of mouldings, but they are inferior to those of the Greek orders, from which they are derived. They are lacking in character, and very often are without refinement. Compare, for instance, the profiles of the Roman adaptation of the Doric order, with all its curves drawn with the compass, to the Greek order, with its swelling and studied forms, full of refinement, and showing a persistent aspiration towards ideal beauty.

The first Romanesque period, in its clumsy profiles and mouldings, its inert masses of materials, exhibits a confusion of ideas which has its parallel only in our confused times, and more especially in America.

That barbaric period, the offspring of anarchy and confusion, is followed by another, still Romanesque, but more homonogeneous, the mouldings of which attain a great perfection and diversity—Romanesque of the eleventh, twelfth, and part of the thirteenth centuries, of which Figs. 11 to 13 give an idea.

From this period to the end of the last century the form and expression of moulding follows a definite and normal evolution, in this, that its forms are constantly controlled and studied. It is, without doubt, massive and superfluous—I was about to say heavy—with the beginning of the mediæval period, and becomes more delicate, even meagre and scarce in some instances, but it always possesses expression, movement, and is expressive of skill and ingenuity. But it loses with the last period many of its useful characteristics, for which reason greater value attaches to the architecture of preceding epochs (Figs. 15 to 17).

The Renaissance period has chiefly been inspired by the Roman ruins still in existence, but it retains that diversity and boldness derived from medieval periods.

It has devolved upon our times to return to the barbaric confusion of the primitive periods of early Romanesque architecture. The ease with which one can, in our days, style himself an architect, without having any genuine feeling for the art, and having scarcely any knowledge of it, together with the immense quantity of artistic materials, in the shape of pictures, photographs and the like, which is thrown into the hands of everybody, has brought about confusion in the minds of many, causing them to mix mouldings at random as they would do anything else. I lately came across a very bad example of such work, and I cannot resist the temptation to illustrate it by Fig. –, and also give a few models of mouldings designed by modern French architects (Fig. 16).

The study of good profiles and mouldings, outside of any other details of architecture, will well repay the student, assisting him to acquire a power of analysis, which is much required in modern architecture.

* Paper read at the seventh convention of the Province of Quebec Association of Architects. For figures referred to in this paper see illustration sheets.

BY THE WAY.

THE new Female Seminary at Washington, Pa., has been designed by Miss Elsie Mercur, of Pittsburgh. The contractor is also a woman, Mrs. Clara Meade, of Chicago. There will be a lively time when women also invade the ranks of the trades unions.

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THERE are in the world persons so dull-witted or lacking in sensitiveness that sarcasm is thrown away upon them. An amusing illustration of this has just transpired in England. With the object of putting a check upon vandalism, the authorities at Darston Head had placed at the entrance to an enclosure containing antiquities, two stone slabs, bearing this inscription: "Persons who are anxious to write their names will please do so on this stone." A number of persons accepted the invitation in good faith, and forthwith proceeded to inscribe their names.

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A PECULIAR occurrence, and one which by fortunate chance, did not result in heavy destruction of life, took place on Sept. 13th last at the newly opened quarries at Windmill Point, Ont., from which the stone is being obtained for the new breakwater at Buffalo. During a thunder storm the guy ropes supporting the derricks served as lightning conductors. At the junction of two ropes the lightning went to earth. One of the six holes, charged with about five pounds of explosive, happened to be directly in the course of the electric current, and was discharged in the midst of a large staff of workmen. Fortunately the other pockets were not discharged, and nobody was hurt.

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A GERMAN inventor is said to have constructed a house in which a series of vertical and horizontal pipes are arranged in all the walls, floors and ceilings, so

that they can be filled with water under pressure and afford a continuous circulation throughout. The water is heated in winter to 100 degrees at the entrance to the system, and is discharged at 40 degrees. In summer cold water is circulated and is discharged at a considerably higher temperature. The thought has frequently come to me that common sense would seem to indicate the use of piping and radiators, in hot water heating systems for the purpose of cooling the atmosphere in summer. Who will be the first architect and manufacturer to introduce the innovation?

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A RECENT report of the British Cosnul to China gives us some interesting particulars regarding customs and regulations in the building trades in that country.

INTERIOR OF PUBLIC LAVATORY, ADELAIDE AND TORONTO STREETS, TORONTO.

Neither masons or carpenters begin work in winter much before 9 a. m. In summer they knock off work for a long two hours' siesta in the middle of the day, and at all seasons of the year smoke, drink tea, and rest whenever it suits them. According to the regulations of the Builders' Guild, wages, if the men find their own food, are 180 cash (about 5¾d.) per diem. These wages are supplemented in the case of skilled laborers by their apprentices' wages, which are paid at the same rate. Apprentices are bound for three years, and as evidence of the scarcity of skilled labor it may be mentioned that on many works half the people are apprentices. As accidents are frequent in the trade, and especially among the unskilled hands, the parent of the apprentice has to give an engagement in writing holding the boy's master free from all liability for loss o life or for injury incurred during the term of apprenticeship, but a present is expected in case of an accident. No interference is permitted, under the rules of the Builders' Guild, with a customer engaging any builder preferred by him. Touting for employment is punishable by a fine, to be fixed in public meeting. No outside firm is allowed to work unless it has joined the guild and received a certificate, the fee for which varies. Assistants or foremen who endeavor to obtain business on their own account from persons for whom their masters work are liable to heavy fine. Masters have to pay the guild at the rate of about one-twentieth of a penny per diem for every man employed by them, to form a fund to meet subscriptions for canal works, etc. A similar tax is levied on assistants to meet the cost of festivals, illuminations, etc. If trouble occurs between a builder and his employees and work is stopped no other labor can be engaged until all outstanding accounts are settled. Breaches of the rules are punishable by fine levied in public meeting. Attendance is obligatory at meetings called to fix the quota to be paid towards subscription funds. Disputes between masters and men are not allowed in the guild house. They must be arranged in the tea houses and opium shops.

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THE interesting features of the Ontario Legislative buildings are only beginning to be recognized. A reporter of a city paper has discovered that "shortly after noon when the sun first strikes the scroll work the shadow thrown is a remarkably exact likeness of the

Right Hon. W. E. Gladstone. An hour later it becomes a clear outline of the late Sir John Macdonald's profile, and then, as if to render impossible any accusation of partisanship in Canadian politics, the shade finally transforms itself into a silhonette of Sir Wilfred Laurier's features." This discovery should lead those who have hitherto regarded these buildings as a pile of uninteresting ugliness to study them more closely in order to find the features of interest which the architect in his wisdom did not think advisable to make plain to the eyes of persons who look only on the surface of things.

PROPORTIONS OF WINDOWS.

PROPORTIONS of window openings and interspaces of openings and their architraves must in practice materially depend upon necessity, and, moreover, it may be remarked that even where windows have only the same space as themselves between them, the same idea of breadth and strength which more than double their width between them gives may be gained by extra height between their heads and the cills of the next floor openings, and though we owe much to the investigators on proportion as to the effect of inter-widths, we have no data about inter-heights, which, for a noble appearance in a building, should be as great as is usually possible. As to the proportion of architraves being not less than a sixth or more than a fifth of the void, it is difficult to conceive on what ground it is asserted. Many most excellent openings, even in Italian architecture, are more; the gate of Ghiberti at Florence, for instance. In other styles it would be useless to particularize what should be the general rule. Not that from this it is to be inferred that in Classical art these rules of proportion can be harmlessly played with by everyone. Rules of whatever kind are most valuable when not meant to repress design, and as a starting-point from which we may see how we can effect improvement; indeed, though they have had the effect of making architecture a commonplace business, executed by commonplace men, yet to one who has been tossed about in the uncertainty of original design, they are like terra firma to his unsteady footing. These rules of proportion especially are most difficult and most valuable, and that they have been departed from at times with great success is no depreciation of their use for the ordinary practitioner; those deviations were effected by men of great genius, guided by study.

LIGHTNING CONDUCTORS AT ST. PAUL'S.

MR. JOHN FAULKNER, of Manchester, has written to give the history of the lightning conductors at St. Paul's. For about sixty years after Wren's cathedral was completed there were no lightning conductors of any sort, and the new building was liable to suffer in thunderstorms—just as its predecessor had been liable and had suffered before it. In 1769 a committee of the Royal Society took the matter in hand, and under their recommendation the metal work of the lantern was connected to the lead of the dome by means of strips of lead and one and a quarter inch square iron bars, the lower portion of the dome's lead roof being connected to the down spouts on the stone gallery, and so to the down spouts of the roof of the nave, and ultimately with the ground, into which the lead down spouts pierced for three feet, a distance considered to be sufficient to carry away any electricity collecting on the building. The pine-apples on the summits of the western towers were similarly connected to the ground by way of the nave roof. In 1873 these arrangements were examined, and it was found that not only had the iron rods rusted so as to be in themselves a positive source of danger, but that in many cases the old iron hoods of the rain pipes, which hoods had originally acted as the connection between the rods and the pipes themselves, had been exchanged for granite hoods six or eight inches thick, through which the electric discharge was left to pierce. Upon this state of affairs becoming known, the dean and chapter appointed Mr. Faulkner to provide efficient protection against lightning, with the result that the top of the cross surmounting the dome and the tops of the pineapples on the western towers were then connected with the sewers in a manner believed to be capable of thoroughly protecting the cathedral from any peril by lightning whatsoever. Mr. Faulkner says that he knows of no building in London which was protected against lightning by a system of conductors prior to 1769, when, as above shown, the cathedral conductors were first erected.

THE EXPANSION AND CONTRACTION OF A BRICK.

CONSIDERING the great importance of the changes in volume of a brick, which result from variations in temperature both during the manufacture and the subsequent use of the brick, it may be interesting, says the British Clayworker, to briefly discuss the subject of contraction and expansion. And in connection therewith it will be especially worth our while to point out definitely the difference between the true contraction of a body and an apparent contraction which sometimes takes place.

Let us begin with a wet brick, that is to say, a mass of particles of clay, amongst which is contained a good deal of water. This water is contained in one and the same brick in two distinct ways:—(1) Some of it is simply mechanically included amongst the solid particles, i.e., in the pores and other cavities which are always found in solid bodies. This water is usually termed "hygroscopic water." (2) Some of it is contained in chemical combination with various of the substances in the brick, and is termed "water of combination."

Let us now heat this wet brick. For a time the total volume of the brick will decrease, and yet not one of the chemical substances usually found in bricks contracts when heated. This apparent contraction of the brick is due simply to the loss of its hygroscopic water. For, as the water is expelled, the clay particles will necessarily be brought into closer contact, hence the shrinking; and accordingly the water which is lost in this way during the first part of the heating is called "water of shrinkage."

Let us now suppose that all this water of shrinkage has been expelled. There is water in the brick still. For although the clay particles are now in as close contact as possible, there are pores which still contain water, and this "water of porosity" will be expelled by further heating. But during this stage of the process a slight expansion of the brick takes place, for, although it is losing water, the clay particles do not come any nearer each other, and each individual particle is expanding.

The brick has now lost all its water of shrinkage and water of porosity, but there is water in the brick still,

viz., water of combination. Let the clay now be raised to a red heat. This will cause the water of combination to be expelled, and a second shrinking of the clay takes place. This is usually termed "fire shrinkage." It may be mentioned, by the way, that this last shrinking can be counteracted by adding sand or chalk; and indeed, if these substances be added in proper proportions, we can produce a slight expansion. The last shrinking due to heat has now taken place, and the brick will now and afterwards behave in the usual manner of solid bodies—it will expand when heated, and contract when cooled.

The whole process may now be summarized in periods as follows:—

(1). A period of shrinking during the loss of some of hygroscopic water ("water of shrinkage.")

(2). A period of slight expansion during the loss of the remainder of the hygroscopic water ("water of porosity.")

(3). A second period of shrinking during the loss of the water of cambination.

And now to conclude with a few remarks on shrinking and true expansion. The expulsion of water from a solid body when heated may be very simply and effectively demonstrated by means of a "lucifer" match. Take an ordinary wooden match and light it; the flame will travel along the wood, and as it does so, a drop of water will be seen moving in front of the flame, although, to all appearances, the wood seemed quite dry. As regards true expansion it is a general law in physics that bodies expand with heat and contract with cold. To this law there are three or four most remarkable exceptions. It has been found by experiment that the following substances contract with heat, and expand with cold:—(a) India-rubber. (b) Garnets. (c) Iodide of lead. (d) Iodide of silver (up to 156 deg. C.) (e) Rose's fusible metal. This substance behaves in a most extraordinary way; it at first expands when heated, but after reaching a certain point it then contracts with further heating. There is another peculiar thing to be noted about this metal, it is an alloy of four parts of bismuth, one of lead and one of tin; and its melting point is as low as 94 deg. C., although that of bismuth is 266., that of lead 326 deg., and that of tin 232 deg.

Let it be noted that in the above list (which is taken from the best authorities on heat) there is not one of the ordinary constituents of clay or bricks.

ILLUSTRATIONS.

CHURCH OF ST. JOHN THE BAPTIST, MONTREAL.—JOS. VENNE, ARCHITECT.

SUN LIFE ASSURANCE COMPANY BUILDING, OTTAWA, ONT.—E. L. HORWOOD, ARCHITECT.

RESIDENCE FOR J. S. WILSON, ESQ., PEARL STREET, ST. THOMAS.—EVAN T. MACDONALD, ARCHITECT.

SKETCHES ILLUSTRATING MR. JOS. VENNE'S PAPER ON "THE ÆSTHETIC VALUE OF MOULDING AND PROFILE."

ARCHITECTURAL COMPETITIONS.

AN invitation is given to architects everywhere to submit competitive designs for new buildings to be erected in connection with the University of California at San Francisco. Plans of site and other particulars will be placed at various accessible points in Europe and America, and ample time will be allowed for the preparation of the designs.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

SERIES OF PUBLIC LECTURES.

The St. Jean Baptiste Society have inaugurated a series of public lectures to be given in the Monument Nationale during the approaching winter. The subjects of these lectures, which will be delivered from 8 to 9 p.m. on week days, and at 3 p.m. on Sundays, are as follows:

Monday—Mines and Metallurgy; Mr. A. Roy, professor.
Tuesday—Architecture and Construction; Mr. Jos. Venne, professor.
Wednesday—Universal History; Mr. P. Demers, professor.
Thursday—Applied Mechanics and Machinery; Mr. A. V. Roy, professor.
Friday—Commerce; Mr. S. Cote, professor.
Saturday—Political Economy; Hon. Jos. Royal, professor.
Sunday—Agriculture and Colonization; Mr. J. X. Perrault, professor.

THE PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The dinners and lectures instituted in former years by the association will be maintained during the coming winter months. With this object committees have been organized as follows:

Committee on Lectures—Messrs. A. Raza, A. T. Taylor and Professor Capper.

Committee on Dinners—Messrs. James Nelson, O. Mailloux and A. Arthur Cox.

Messrs. S. H. Capper, Professor of Architecture at McGill University, Edward Maxwell and Jos. Venne, of Montreal; Chas. Baillairge, F. X. Berlinguet and Harry Staveley, of Quebec, have been elected examiners in their respective cities for the Association Examinations in Architecture in 1898.

As decided at the last annual meeting, the Association will apply to the legislature at its approaching session for amendments to its charter, and especially to article 13. We hope success will crown these efforts, which have for their object the promotion of the interests of architecture.

AN IMPORTANT LEGAL DECISION.

A case of considerable interest to architects, builders and owners of real estate, has just been argued and decided in the courts of Montreal. Action was recently brought by the city building inspector against Mr. Eusebe Paquette, a local contractor, for violation of the city building by-law, by having used porous terra cotta blocks instead of ordinary bricks, in the construction of the interior partition walls of a building. Several of the leading architects of the city were called to give evidence regarding the strength of the material of which complaint was made. The defence also submitted results of the material made at McGill University as follows:

FACULTY OF APPLIED SCIENCES,
McGill University.

TESTING LABORATORIES.

Results of crushing test of two specimens of terra cotta lumber:

Specimen 1, tested on flat—

Dimensions	equal to:	12 × 8 in.
Sectional area of hollows	"	3⅜ sq. in.
Total crushing strength	"	46,000 lbs.
Crushing strength per sq. in. of bearing surface	"	479 lbs.

Specimen 2, tested on flat—

Dimensions	equal to:	12 × 8 in.
Sectional area of hollows	"	3⅜ sq. in.
Total crushing strength	"	67,000 lbs.
Crushing strength per sq. in of bearing surface	"	677 lbs.

[Signed] HENRY T. BOVEY,
Dean of Faculty of Applied Sciences,
McGill University.

September 9, 1897.

It was established that terra cotta blocks had been in use in the city for a number of years. The Recorder's decision, which was given in favor of the defendants, will be published in full in a later issue.

LEGAL.

J. RAWSON GARDINER v. MICHAEL C. FOLEY.—This was a case argued before Mr. Justice Davidson, at Montreal, October, 1897, in which Mr. Gardiner, an architect practising in Montreal, sought to recover from defendant the sum of $384 for professional services rendered in connection with and in preparing plans for certain alterations and additions to two houses on Victoria street, Montreal, at an estimated cost of $6,000, and also in connection with and preparing two sets of plans for a new building to be used as a hotel on the same site—the old buildings to be taken down. The first set of plans was to cover two lots and the second set of plans was to cover three lots. This last set of plans was for a building 4 stories in height and estimated to cost (at 12 cents per cubic foot) $38,400. The plaintiff in this case was billing defendant for 1 per cent. on the estimated cost of the last building—that is for preliminary sketches for this building—which is $384, and not charging for the other drawings which he claimed he was legally justified in doing. Defendant filed a confession of judgment for $100, with interest and costs for a like action, which plaintiff refused. Plaintiff in his evidence showed that the plans produced were made by him, and had taken over a month to produce, and claimed that he was undercharging rather than overcharging the defendant for the work done, besides claiming his right, according to the custom of the profession to charge 1 per cent. on the estimated cost for preliminary sketches in case of the abandonment of such building. In support of his claim he also called three other architects, Mr. A. T. Taylor and Mr. Nelson, past presidents of the Architects' Association of Quebec, and Mr. Findlay, who each stated that the plans as produced were fully worth the charge made. Mr. Taylor also stated that plaintiff had a further right to make a charge for his time on the first two sets of plans and that the plans produced were even more than what was usually given as preliminary sketches, and explained that the reason why 1 per cent. for such services was fair and just was that in preparing those preliminary sketches the architect used his knowledge and experience, and that the rest of the work could to a large extent be worked up by draughtsmen from these sketches and by more or less mechanical means, but it was from these preliminary sketches that the planning and designing, or otherwise the art and talent of an architect, were shown. The judge dismissed the defendant's plea and said that he had not proved by his own evidence that the work was not done according to his wishes, or that the plaintiff's charge was contrary to the custom of the profession. He therefore maintained the action—pro tanto—and condemned the defendant to pay plaintiff the sum of three hundred dollars with interest from May, 1897, viz., the date of service of process, cost of suit, etc.

Mr. Singleton: Isn't that the house that Planns, the architect, has just been building for his mother-in-law? Mr. Gotwun: It can't be! don't you see there is a lightning-rod on it?

The attractive feature of the Trans-Mississippi Exposition, to be held at Omaha in 1898, is to be a silver palace, to be used entirely for the display of mineral and other products of the west. The building will be 400 feet square, surmounted with ornamental towers, and the entire structure covered with rolled silver.

CHICAGO ARCHITECTS' BUSINESS ASSOCIATION.

THE Chicago Architects' Business Association has adopted the following rules of practice:—

DRAWINGS.

SECTION 1. All drawings forming a basis for contracts shall be drawn to a scale of not less than one-eighth of an inch to the foot, in ink or by some other process that will not obliterate. General dimensions shall be accurately figured and the drawings made explicit and complete.

SCALE DRAWINGS.

SECTION 1. All portions of the work that require a larger scale to illustrate the same shall be drawn full size or to a scale large enough to make them fully set forth what is required by the architect. No architect shall ask for bids on any work until all general drawings are complete and sufficient details made, which, in connection with the specifications, will settle all questions affecting the cost of work.

SUPERVISION OF WORK.

SECTION 1. The supervision of an architect shall be such as shall require the faithful execution of the work according to the true meaning and intent of the plans and specifications, but such supervision does not cover the duties of a clerk-of-the-works. In case there is no clerk-of-the-works provided by the owner, contractors must refer any questions about which there can be any doubt to the architect for decision before proceeding to execute the work.

SPECIFICATIONS.

SECTION 1. Specifications must be prepared in ink or by some permanent process, and shall clearly explain the kind and quality of materials and methods of construction, and give such further information as may be needed to definitely supplement the drawings.

SEC. 2. Everything that will be required in the work must be mentioned in the specifications as far as practicable, being classified and grouped under appropriate headings, and work called for by the plans and not referred to in the specifications and vice versa, shall be included same as if mentioned by both plans and specifications, provided such work comes clearly within the branch or branches covered by the contract.

RULES FOR LETTING CONTRACTS.

SECTION 1. Written invitations for proposals will be forwarded contractors for work to be let, stating when bids will be opened. This does not apply to public work requiring advertisement for proposals.

SEC. 2. Contractors desiring place upon the roster of an architect's office shall furnish reference to mechanical ability and fidelity and be prepared to furnish a good and sufficient bond.

SEC. 3. Proposals shall be presented on the day set for opening same and will be opened in the presence of a representative of the bidders.

Proposals shall be opened, read and posted at the time specified before such bidders as are present. Contracts shall be awarded by owners or architects within a reasonable time thereafter.

Bidders shall not be held on proposals retained longer than ten days after date of opening.

SEC. 4. The lowest bidder will not be permitted to change the amount of his bid, but must sign contract or withdraw. The right is reserved to reject any or all proposals.

SEC. 5. If, after the opening of bids, changes are made in the plans and specifications amounting to not more than ten per cent., the lowest invited bidder shall tender a detailed proposition for said changes, subject to the approval of the architect and owner, and, if found fairly detailed, the contract shall be awarded to him upon his bid so changed.

SEC. 6. Lack of ability to carry out the work in a proper manner, want of fidelity, or disposition to render less than is due the owner in strict conformity with the terms of contract, shall lay the contractor liable to be dropped from the roster of the architect temporarily or permanently, as in the judgment of the architect is just and right, and in the interests of his clients.

SEC. 7. Final certificates of payment on a contract shall not be issued by the architect until the contractor has returned al plans and specifications to the office of the architect.

H. B. WHEELOCK, President.
C. R. ADAMS, Secretary.

Adopted September 9, 1897.

STUDENTS' DEPARTMENT.

ON OBSERVATION.*

By Leonard Stokes, F.R.I.B.A.

Curiously enough, our English system of apprenticeship is based almost entirely upon the system of observation. The young man observes how the old man does it—in the same way, somewhat, it is true, as a conjurer may be observed to bring two live rabbits and a bunch of flowers out of an empty hat, placed on a small three-legged table placed under our very noses. Well, as there are smart conjurers and clumsy conjurers, so there are good architects and slovenly ones. In each case their tricks—for they are really little else—can be acquired by some of us, but I regret to say that the tricks of the clumsy are more easily observed, and therefore acquired, than those of the smart and good.

The pupil in a moderately good office undoubtedly enjoys many advantages, but if he only observes the rules of the office and does what he is told he will not get very far, I fear. No, he must not only observe for himself how certain problems are overcome on paper, but he must also observe for himself the effect and result in actual work. He might observe, for one thing, how a mistake made on paper—perhaps by himself—may involve the modification of a whole feature, or even the whole end or side of a building, when it comes to be put up. He may observe how a carelessly made and unworkable section—when reduced to bricks and mortar—produces unthought of difficulties such as want of head-room on your stairs, or suchlike trifles; how foremen will always follow the wrong drawing if two don't happen to agree, and how easy it is for him to go wrong if there is any ambiguity in them at all. These observations will, I hope, teach him the desirability of making drawings accurate; for unless a drawing is accurate, it is very little use at all, unless it is to show to a client to whom, correct or incorrect, it is, in 99 cases out of 100, simply so much Greek. Showy drawings are, no doubt, a kind of credit to the office, and it is always a pleasure to look at a drawing that has some style about it, but after all drawings are only a means to an end, and that end should always be kept well in view. If you want to win a competition, make your drawings as showy and as inaccurate as you like, but if you wish to get your building put up as you want it, then let your drawings be as numerous as possible and absolutely correct; of course if you can make them look well into the bargain, so much the better.

Now the advantage the pupil has is that he sees so many things going on around him, and if he is worth his salt he will take advantage of this, and the observations he should make at this period of his career will be of the greatest use to him in after life. He can, you see, train his eye on the works of his master. I don't mean that his master will let him design or alter anything much, but what the pupil must do is to observe how the design looks on paper, and form his own opinion as to what it will look like in execution (this he had better, perhaps, keep to himself), and when he sees the work in reality, he must note how far his judgment has been right, or how far he has been led to misjudge the whole by not being able to see it in his mind's eye whilst looking at the drawing only. Situation, too, may have something to do with it, and what he thought would look heavy or clumsy on paper, may look just the reverse when put in position and seen in conjunction with its surroundings—and this question of surroundings should have a great deal to do with the question of design, although I fear that enough attention is not always paid to it.

Another form of observation, which cannot well be over-estimated, is sketching and measuring existing work. You see what we have to do now-a-days is to make paper designs, which, when executed by the builder, will, firstly, answer the purpose for which they are intended, and secondly, satisfy the eye. Now, a young man wanting to learn how to do this has to work backwards, so to speak. He must first find his ideal building, and then set to work to reduce it to paper; and, having done so, he should be able to look at his drawings and see the building standing out in all its balance, dignity and beauty. The more careful the study the greater the reward; and, after a time, he will be able to think on paper to any given scale, and these thoughts, when handed over to the builder, can be worked out so as to produce just the effect desired.

The eye, too, should be trained to see things in perspective, even though they are only drawn in elevation and, if the eye cannot at first be brought to do this, the hand may be sworn in, for the habit of thinking, sketching and seeing things in perspective will be found of the greatest use in designing. Far too much work is thought out, only on the flat, and hence, when executed, is unsatisfactory; observation is the never-failing remedy, and it is surprising, how, after a little bit of it, your brain and eye become most obedient and expert, and you can either think or see round corners with the greatest ease.

Besides the study of what is generally called old work, the study of contemporary work should follow, hand in hand. Observe again, how our best men get their best effects, and observe also where they fail; for, perhaps, one of the greatest uses of observation lies in its teaching us what to avoid. Books, too, may be of great use to us if used judiciously, but I am inclined to think they are often very much abused, and many a man's work bears the impress of book knowledge where it should rather give evidence of independent thought and a living treatment. Photo-lithography may be a blessing in some ways, but our streets should not be simply composed—as they too often are—of a collection of the most fashionable plates that have appeared, from time to time, in the building journals; adapted it may be, to some extent, to their new requirements, but never looking more than make-believes at the best.

A young architect should, of course, read, and there are some books, that he must almost live with, as they will help him to appreciate what is good and noble about his calling, and lift his drooping spirits after a day's specification writing or drain planning. But I cannot help feeling—take it for what it is worth—that an hour in a fine building will open a man's soul more than a week's reading, and sketching in a museum will do him more real good than all the histories of architecture that were ever written. Do not misunderstand me, pray; I am speaking of the young architect, and of what will help to develop the architect within him; but, of course, the young gentleman—forgive the term—must not be forgotten, and he must acquire many things, such as history and knowledge of the styles, etc., for general purposes, such as passing examinations and to commit him for committee meetings and architectural societies. But it is a man's soul that has to be developed if we want to make an architect of him; and few book-worms have, I think, large souls, their chests are too narrow, and I can hardly fancy a good architect with a narrow chest even, for good work seems to come from the chest and shoulder as much as anywhere; and, if these are bent and hollow, so will the work they produce be weak and lifeless, however full of precedent and learning it may be.

* From a paper read before the Liverpool Architectural Society.

HINTS TO DRAUGHTSMEN.

Draughtsmen, as well as others, have their little kinks, and the publishing of these kinks often helps others. A practical draughtsman gives the following simple suggestions, which will likely prove useful to some reader: In mixing up inks the process is very much expedited by heating the dish and water in which it is mixed before commencing. It often happens in the summer that the flies walk over a tracing and eat off the ink in a very provoking manner. The use of vinegar instead of water will prevent this. In making a tracing the cloth will take the ink much better if it is rubbed over with chalk. Tracing paper that has been rolled up may be straightened out effectively and expeditiously by drawing it over the edge of a table or drawing board, holding it down meantime with an ordinary three-cornered scale. Where there are a large number of drawings made and kept, a great deal of trouble and confusion can be avoided by making all the drawings on extra standard sizes. If a size of 16 in. by 24 in. be adopted, then the next larger size would be equal to two of these, or 24 in. by 32 in. This enlarging or reducing may be carried as far as the circumstances require, but it is altogether best to do it by the doubling or halving process if possible. One of the advantages of standard sizes of drawings is that they may be kept in a case of drawings, the size of which is made to accommodate the standard sizes determined upon.

In the imperial Russian theatres a new prompter's box has been introduced which offers a problem in acoustics, which has a wider application. In many cases the occupants of the boxes nearest the stage can hear the prompting almost as well as the actors. The new Russian invention consists of a box that resembles a shell, and which is enclosed within a short cylinder. The timber employed is perfectly dry; it is then thickly varnished and covered with alternate layers of felt and compressed paper. The prompter is at a depth which makes him invisible to the audience, and not one of his words can be heard in the auditorium. But from the form and method of construction of the box a whisper can be heard distinctly on the stage.

Hardening Cement Paving.—Portland cement paving will attain a considerable degree of hardness without any dressing or any special treatment; but paving laid in damp weather will ultimately attain a greater degree of hardness than that laid in very hot weather. Further hardening of the surface may be produced by keeping the work moist by means of wet clothes, or by damped sawdust or sand laid over the paving as soon as it has set; flooding the work with water, where this is possible, will be best of all. Miller mentions that cement work may be rendered very tough and hard by gauging the material with 10 to 15 per cent. of minion—the siftings of ironstone after calcination. Indurating concrete slabs causes them to become very hard; by it their density is increased and their porosity lessened. A solution of soluble silicate of soda 1 part to 10 parts of water may be applied to in situ paving, but the pickle should not be applied until after the lapse of a couple of days, by which time some of the moisture will have evaporated and thus allow the silicated solution to penetrate the pores of the material, for which the silicate has a great affinity.—Building World.

PERSONAL.

F. X. Pronoveau, sr., contractor, Montreal, is dead.

John Reilly, of the firm of Reilly Bros., contractors, Regina, is dead.

Messrs. Hewitt & McLaren, architects, have removed their offices from Brantford to Ottawa.

Mr. H. A. Englehardt, a well-known landscape gardener, died in Toronto in the early part of the present month.

Mr. Barrow, city engineer, of Hamilton, was recently elected a member of the Sanitary Institute of Great Britain.

Mr. John M. Gill, president of the James Smart Manufacturing Co., of Brockville, was tendered a complimentary banquet by the employes of the company on his return from Europe recently.

Mr. Beaumont Jarvis, architect of Toronto, is receiving the congratulations of his friends on his recent marriage to Miss Anna Adeline Hamilton, daughter of Mr. James C. Hamilton, L.L.B., of Rosedale, Toronto.

The death by suicide is announced of Mr. John McIntosh, of Stellarton, Nova Scotia, a prominent and highly respected contractor. His death is believed to have been in a measure due to anxiety resulting from losses sustained by the recent fire at Windsor, Nova Scotia.

Wm. Craddock, a prominent contractor of Chatham, Ont., died in that city a fortnight ago, aged 73 years. Deceased was a native of Cornwall, England, but spent many years of his youth in France. In 1848, one year after his marriage, he came to Canada and located at Chatham, where he continued to reside, and where he occupied various important public offices.

USEFUL HINTS.

Asphalt Varnish for Iron.—A tar-asphalt varnish for iron consists of 30 parts West India copal, 30 parts American pine resin, 30 parts mountain asphalt, 6 parts yellow wax, 6 parts Venetian turpentine, melted, and mixed with 12 parts rosin oil, 10 parts linseed oil varnish, 30 parts oil of turpentine and 30 to 45 parts benzole.

Acid-Resisting Putty.—A putty which will even resist boiling sulphuric acid is prepared by melting caoutchouc at a moderate heat, then adding 8 per cent of tallow, stirring constantly, whereupon sufficiently slaked lime is added until the whole has the consistency of soft dough. Finally about 20 per cent. of red lead is still added, which causes the mass to set immediately and to harden and dry. A solution of caoutchouc in double its weight of linseed oil, added by means of heat and with the like quantity (weight) of pipeclay, gives a plastic mass which likewise resists most acids.

Double Windows.—According to Dr. Didtmann, of Linnich, the advantages of double windows may be cheaply procured by puttying in a second pane of glass in the inner rim of the window frames, on the outer rim of which the first one is put in. This creates between the two panes a layer of air inaccessible for the room air as well as the street air, which layer is a bad conductor of heat. In puttying in the pane, care should be taken that not only the inner surfaces are cleaned of dust and dirt, but also that the air between the panes be dry; hence the work should be performed in dry weather only. Frostwork will never appear on such windows. In summer these windows are also a protection against the annoying heat of the direct rays of the sun. A room containing windows with double panes, at a temperature of about 90 degrees Fahr., will remain 8 degrees cooler than with single panes.

All iron that is used for structural work should be thoroughly covered or painted with a good preservative paint, just as soon as it is possible to do it after it leaves the foundry, or place where it is shaped up. The reason for this is that the moisture in the atmosphere permeates the pores of the iron and starts the rust to forming. These little corpuscles that gradually grow larger and larger with age, are not noticeable at first, and the iron is placed in position without anything being done to obliterate them. A great many are ignorant of the fact that because the rust cannot be seen, therefore there is no rust. There never was a greater mistake. Rust will always form on unprotected iron or steel, no matter how much it is protected under cover of bricks or stone, or wood either. Wherever the air can penetrate, it causes the moisture to settle, and this dampness breeds the rust: the rust then feeds upon air and the substance on which it is first found.

THE NEW YORK STREET BRIDGE, TORONTO.

THE York street bridge, Toronto, an illustration of which is given on this page, is now completed, and gives a much needed and convenient access to the various rowing, canoe and yacht clubs, and to the steamboat wharves which are located on the new Lake street now being constructed on the water front, without the dangerous and inconvenient level crossing over the several railway tracks. This bridge has been erected in accordance with Clause 7 of the Esplanade Agreement between the city and the railway companies, which provides that "an overhead traffic bridge, with ramps and approaches for vehicles and foot passengers, is to be constructed by the C. P. R. Co. along the east side of York street, according to plans and specifications to be approved of by the City Engineer of Toronto and by the chief engineers of the G. T. R. and C. P. R. Companies, such bridge to be a public highway and to be of sufficient width to accommodate a double street railway track, with side spaces for vehicles and foot-walks, and to be so constructed as to give access for passengers by means of foot-walks, stairways, or otherwise, to the platforms of the proposed Union Station." The bridge is of the type known as the Deck Bridge, and consists of about 35 spans, varying from 70 feet, the longest, and 13 feet 2 inches, the shortest. This variation in span was necessitated by having to cross railway tracks already in existence and others contemplated, also railway station platforms and roadways.

The plans for this bridge were prepared by Mr. P. A. Peterson, chief engineer of the C. P. Railway Co., which, after some alterations, were approved of by Mr. E. H. Keating, City Engineer. The approach from Front street is of masonry, and is 85 ft. 10½ in. in length. The two south approaches (one from the east and one from the west) are also of masonry, and are each 115 feet long; the width of the roadway from Front street to the approaches on Lake street is 37 ft. 6 in., with a sidewalk on each side of 7½ feet clear. The approaches on Lake street have a roadway of 31 ft. 6 in., and a sidewalk on the north side only of 7½ ft. wide, making a total length of roadway, including the east and west approaches, of 1,580 ft.

The piling for the piers and abutments was done by the C. P. Railway Co.; the contract for masonry was awarded to the Owen Sound Stone Company, and the iron and steel work was furnished by the Central Bridge Co., of Peterboro', Ont. The Bridge Company commenced their erection on the 23rd of October, 1896. The deck and sidewalks were laid by the C. P. Railway Co., and consist of 4-inch creosoted southern pine, upon which was laid rectangular pine blocks, all interstices being filled with paving pitch.

The sidewalks are of 2-inch tamarac planks. The parapet railing and the terminal posts are of a substantial character, but neat in design.

NEW YORK STREET BR[illegible]ONTO—LOOKING EAST.

Probably, as the result of the petition of the P. Q. A. A. to the City Council of Montreal, the suggestion has been made in the Council of the suburban municipality of Westmount, that a committee be appointed to regulate the erection of public monuments and memorials, and pass upon the design of public buildings.

MASTIC.—A French engineer recently discovered a new kind of mastic, which is already largely employed throughout France, and which has even begun to be exported in considerable quantities, especially to eastern countries. The product, which, it is asserted, is indestructible, is composed of linseed oil mixed with ninety-three parts of powdered brick and seven parts of litharge, the brick and the litharge being pulverized separately, then well mixed and reduced to a paste by means of the oil. The object to which the mastic has to be applied should first be dampened with a sponge. After application, in say about three or four days, the coating becomes perfectly hard, and will effectually prevent the filtration of water in terraces, basins and masonry in general.

MANUFACTURES AND MATERIALS

NEW ARTIFICIAL FLOORING.

A NEW artificial flooring material is said to be meeting with success in Germany. The material, which is the invention of a German named Knoch, is called Xyolith. It is said to be proof against sound, water, dampness and fire, and can be colored to represent tileing, or finished to represent wood or woods, varnished, polished, stained or finished in almost any way desired. It is very easy to the feet in walking, makes a very warm flooring, harbors no insects of any kind, is very easily kept in order, and is adapted for the walls and ceilings as well as floors. It is made by the following process:

Dissolve chloride of magnesium in water till the solution shows a hydrometer strength of 27-B-(Alkali Hydrometer). In another vessel dissolve a pound of salt in a little more than a quart of water, and see that every particle of salt is dissolved. Into a tub put sixty-six pounds of burned powdered magnesia and four and a quarter pounds of leather meal, made of ground up leather scraps. Pour on the salt solution and mix all together, then put in thirteen and a half pounds of the chloride solution, and knead all into a stiff paste. Great care must be taken to have this very thoroughly worked and of uniform consistency in all respects.

The material is now ready to spread on the walls or to lay on the floors, or to plaster on the ceilings. In covering on the floor, the whole floor can be covered at once if so desired, or it can be blocked off, and laid in figures and colors, as one's taste may indicate. In any case, the surface, floor or walls, should be smoothed as soon as possible. It hardens rapidly, and a floor laid one day is fit for use the following day. Increasing the amount of leather meal very much improves the durability and appearance of the material. Floors of this kind can be laid over old floors, if they are solid, and over stone, brick, tileing, or anything that affords a good sure foundation.

BUILDING MATERIALS.

FROM the sixth annual report of the Ontario Bureau of Mines it is learned that there has been a steady decline since 1891 in the amount and value of various kinds of building materials manufactured in Canada. The statistics of the stone quarries show that the value of product in 1891 was $1,000,000 and the amount paid in wages $520,000. In 1896 the value of product was only $394,000, and the wages paid amounted to but $273,000. In 1891 there were manufactured 160,000 common brick, valued at $950,000, and 7,500 tile, valued at $90,000. The wages paid totalled $432,000. In 1896 there were manufactured 105,000 bricks, valued at $577,000, and 13,200 tiles, valued at $144,000. The wages paid amounted to $306,000. It will be noticed that prices and wages have both declined. The comparison for pressed brick, roofing tile and terra cotta stands as follows: 1891, 13,617,909, value, $156,699, wages, $58,000; 1896, 12,201,000, value, 129,845, wages, $60,000. Here we have a considerable decline in prices and an increase in wages. The production of lime in 1891 was 2,350,000 bushels; value, $300,000; wages, $116,000. In 1896 the production was 1,880,000; value, $220,000; wages, $85,000.

Regarding cements, the report states: "The production of natural rock and Portland cements is well maintained as compared with previous years; but while the makers of Portland cement have been steadily increasing the output of their works, and improving the quality of the cement, they are far from being able to supply the requirements of the country. The raw materials for Portland cement are so plentiful in Ontario that we might be making largely for the export trade instead of importing for consumption." The increase has been much greater in Portland than in natural rock cement, the output of the former being 154 per cent. more in 1896 than in 1894, whereas that of the latter has been less than 10 per cent. The price is lower than in 1894, Portland cement having fallen from $2 to $1.77, and natural rock from 88 cents to 72½ cents per barrel. The quality of both kinds is well maintained, and the fact appears now to be generally admitted that the Portland cement compares very favorably with the best of the same class made in Europe. The manufacturers, however, are not yet able to meet the demands of the home market, for during the fiscal year ending June 30, 1896, Canada imported 210,065 barrels, valued at $255,029. The output of Canadian Portland cement is, however, likely to be very considerably increased this year.

The following table gives particulars of the production of various kinds of materials for the year 1896:

Product	Quantity	Value.	Employes.	Wages.
Building stone, rubble, etc..		$394,000	780	$273,000
Cement, natural rock, barrels	60,705	44,100	56	15,200
Cement, Portland, barrels...	77,760	138,230	120	48,400
Lime, bushels........	1,880,000	220,000	430	85,000
Drain tile, number..........	13,200,000	144,000	1,850	306,000
Common brick, number.....	105,000,000	577,000		
Pressed brick, plain, number	10,774,400	88,945	180	60,824
Pressed brick, fancy, number	1,256,600	9,910		
Roofing tile.	170,000	6,800		
Terra-cotta................		24,190		
Sewer pipe..................		49,875	41	17,774
Gypsum, tons	3,500	10,500		
Calcined plaster, tons.......	700	10,250		

PUBLICATIONS.

The Toronto Radiator Manufacturing Co., of Toronto, have just issued a handsome supplemental catalogue for the years 1897-98.

A copy of the proceedings of the twelfth annual meeting of the Association of Ontario Land Surveyors is to hand. It is a volume of over two hundred pages, and is rendered especially interesting by the many valuable papers on surveying and engineering subjects, which shows the association to be progressive. Copies of the report may be obtained from the secretary, Mr. A. J. Van-Nostrand, Yonge street arcade, Toronto. The price is 75 cents.

Sandpaper is made with powdered glass instead of sand. Glass is easily powdered by heating it red-hot, throwing it into water, and finishing the powdering in an iron mortar.

The new Wortley road Baptist church, at London, Ont., of which Messrs. Burke & Horwood, Toronto, are the architects, was formally opened a few days ago. It is a brick structure costing $7,500, and has a seating capacity of 400.

According to Engineering, a few days ago, the uses of a new cement, or petrifying substance, wore demonstrated to a large party of Glasgow gentlemen at the works of Messrs. Morrison & Mason, Limited, Polmadie. For this new substance, to which the name of "Petrifite" has been given, many marvellous properties are claimed. It is a Continental invention, and already the patent rights have been taken up in Germany and Russia. Petrifite is a flour-like substance, composed, it is understood, of a peculiar kind of lime-stone mixed with chemical matter. Like Portland cement, it binds together gravel and sand; but while Portland cement can only be used as a binding element for washed sand and gravel, it is claimed for petrifite that it can be used for binding earth, peat, clay, lime, chalk, waste of mortar, pottery, glass, slate, any kind of sand, coal, burnt ballast, clinkers, ashes, straw grass, vegetable or animal fibre, alkali waste, sawdust, asphalt, pitch, etc.; and as the results of the petrifying process there may be produced building stones, ornaments, statuary, bricks, billiard balls, marble blocks and paving stones.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Finish.

BUILDINGS of to-day are very much different to buildings erected earlier in the century, so far as the finish is concerned. The builder of to-day is satisfied if he can put a good front on his work, and give an air of neatness to a room; but he seldom cares to waste time in making good and secure the work to be covered. Grounds, skirtings and linings are put in place and nailed fast without reference to their being true on any edge or side, than the one to be worked on. Wainscoting and other beaded stuff is just as often set up out of plumb as it is on purely vertical lines; door and window frames are frequently set out of plumb, and as often out of square, but, if the eye cannot detect it without the aid of an appliance, it is let go, and if the work has a good appearance, that satisfies the modern workman. He mistakes neatness for finish in nearly everything he does, whereas neatness has been well described as a cheap substitute for refinement. That is to say, he is satisfied if he scrapes his surfaces clean and smooth and leaves the woodwork on the exposed surface in good order for the painter, whom he allows to hide many a blemish with putty and paint. A repetition of sizes, in doors and windows, in moulding, in ornament, and in everything that can be repeated, is the rule, and every irregularity is scrupulously avoided. He prefers monotony, for it is cheap, and if he can repeat one window a hundred times, so much the better, and if a set pattern of factory wrought moulding can be utilized, it will surely find a place, as it is cheap and neat. Such work may go under the name of neatness, it may look neat, in fact it is neat, but it is not finish as finish is understood by people of taste. One of the characteristics of finish is contrivance; another is fitness. Doubtless the contract system is accountable for much of the sameness of finish now in vogue, and architects, when designing, too often take their mouldings, doors, newels, brackets, &c., from the catalogue and price-list of some manufacturer, from whose stock of dry wrought stuff the contractor draws his supplies.

Imitation.

WHILE it is a truism that the free use of machine wrought stuff has lessened the cost of building very much within the last thirty years, and thereby enabled many a poor man to own his own homestead, it has had the effect of lowering the standard of good taste in the art of building in many departments. Let us, for instance, take as an example modern joinery, which is now mostly prepared by machinery, especially as applied to openings. It is quite the exception now to find mouldings worked from the solid as they formerly were. Moulded doors are doors that have mouldings planted in the panels and nailed or glued in place. Door jambs for brick or stone walls were framed and panelled, and had soffit linings panelled and were fixed to plugged backings or framed grounds. Such work nowadays is simply a wide jamb of two-inch plank, rebated to receive the door, and finished with architraves on each face, with a band moulding made at the factory and having the same section as thousands of feet of other mouldings from the same factory. The windows and frames are put together as cheaply as possible, and if they answer the purpose at the closing of the building contract, that is sufficient to make them pass muster, and it is no wonder that in many modern houses the windows continually want the doctor. In the older period, and in the older towns of the country, it was the fashion to have the old double-hung sash windows, with panelled backs, elbow linings and panelled shutters hung in two or more leaves, which folded back into boxings, and in good work the shutters and flaps were all made to appear alike; the back lining was carefully tongued into the lining of carved frame, and also into the ground of boxing. The hinging was skilfully managed, and everything was done when the shutters or blinds were closed to make the screen look finished. There are many examples of this complete finish still existing in old Montreal, old Toronto, old Hamilton, St. Catharines and other frontier towns, and it would be an object lesson to many young carpenters, to see and study one of these old time windows when all, or nearly all, the work was done by hand, and the mouldings worked from the solid. There was no imitation in the work; no two buildings were finished alike.

Something for the Bricklayer.

ALL flue-doors, ash-doors, stove-rings and ventilating registers are generally marked on well-prepared plans, and should be placed in position as the work goes on. If left for subsequent cutting in the wall, they are sure to be forgotten. Rings for furnace smoke-pipes should never be less than sixteen inches from the cellar ceiling. All flues must be closed at the bottom, unless they are intended to ventilate the cellar or joists under the foundation, but where this is the case, no smoke pipe or fire-place must connect with that flue. Flues should not connect with one another, but should be kept separated to the top. The withs or walls should not be less than four inches thick, and should be bonded once in every eight courses at least, in ordinary chimneys, by having the bricks roughly mitred with the stretchers in the wall. "Sometimes," says Clark, "ties of tin or hoop iron are laid in the points to sustain the withs,

but a mitred bond is very much better, particularly in tall chimneys, where a thorough interlocking of the withs with the outside walls adds very greatly to the strength of the shaft. Stacks of chimneys having an irregular plan, may be bonded quite easily by running the withs through the walls every sixth course and allowing them to show outside as headers. The bricklayer should see that all flues are properly and smoothly parged from bottom to top, and the mortar used for this purpose should be of a little better quality than that used in laying the wall. A good draft depends very much on the smoothness of the interior of the flue. All flues should be cleaned out at the bottom before the bricklayer leaves them, for if the droppings of mortar are left in them for a time, it is next to impossible to clean them out, the mortar will have so hardened. If carried up smooth and fairly straight inside, and without twisting or narrowing up anywhere, a flue 8 inches by 8 inches will be large enough for any stove and for many furnaces, but, when space will allow, it it always better to have a flue for the furnace 100 inches in area. Stove pipes are usually seven inches in diameter. In no case should a flue have a less area than the pipe entering it, if a good draft is desired. If this rule was strictly observed, it will be seen that the customary method of making the area of a flue one brick long and a half a brick wide, would not be allowed; and it may be put down as a fact, that the smoking of one half of the chimneys is due to the flues not having sufficient area.

Foundations. No part of a building is more important than the foundation and more cracks and failures in buildings will be found to result from defective foundations than from any other cause; and for such defects resulting from the neglect of the builder, the owner will have a fair claim for damages; therefore, if for no other reason, the builder should use every precaution to have his foundation substantial and sufficient to carry the load intended to be placed upon it. For ordinary two story brick buildings, such as one erected for domestic purposes, there should be no trouble whatever in putting down a foundation sufficient to carry it, unless the ground be a swamp or a swail. For a building of the kind named, if the bottom is sand, gravel, shale or sandy loam, footings two feet wide and five or six inches thick, will be ample to carry a fourteen inch wall two stories high. The footings should be of good, sound quarried stones, and should be laid below the frost line; on these footings build a good rubble wall not less than one foot six inches wide, and as high as required. If the earth is of clay, the builder must exercise his judgment in the matter, for if it is a soft yielding clay his footing will have to be much wider than two feet. Indeed, it may be that he may have to lay oak or cedar planks under the footings, making a foundation of five or six feet wide at the bottom; this, however, will depend on the nature and dryness of the clay. For dry, a width of two feet will be ample, but if wet or moist, the width and depth should be increased accordingly. It is quite safe to build on any kind of rock without extra footing, as the softest rock, if not shaley, is as good as the best earthy bottom. When building on a rock bottom, some measures must be taken to allow of water flowing away from under the foundation, as it cannot soak through the rock as it would through soil. Builders living in certain localities should make it a point to discover the sustaining power of the soil in their several neighborhoods, and then they could build with a certainty of having their structures stay where they were put.

Proportions. In estimating for brickwork it is quite necessary that the proportion of mortar required to lay the bricks should be known, and though it can not be given accurately, it may be got at sufficiently near on which to base an estimate. The better the brickwork, the less mortar will be required, for good brickwork means fine joints and little mortar, while coarse brickwork means great grinning joints and wide spaces. With bricks of $8\frac{1}{4} \times 4 \times 2$ inches, the following are the quantities of mortar as compared with the whole mass; and the number of bricks required for a cubic yard of massive work:

Size of joint.	Amount of mortar in mass.	No. of bricks in cubic yard.	No. of bricks in cubic foot.
1/8	1/9	638	23.63
1/4	1/4	574	21.26
3/8	3/10	522	19.33
1/2	1/3	475	17.60
5/8	4/10	433	16.04

From the foregoing, the bricklayer can easily figure out how much mortar he will want for each thousand bricks laid, knowing the price of lime and cement, for often he may be called upon to lay his bricks in cement.

Electric Bells. Nearly every house of any pretention is supplied with electric bells and annunciator in the kitchen, and perhaps other electrical appliances in various parts of the building. Where the carpenter does this work, he should make it a rule to have all wires running from the various bells to batteries, concealed either behind the lath and plaster or along the line of some woodwork where they will not be noticed. All wires used for this purpose, must of course, be of copper and insulated, that is, covered with some non-conducting material. In choosing bells, it should be seen to that no two bells have a like tone, or confusion will surely take place in answering them. There will be no trouble in procuring bells with different tones. Ordinarily five bells will be sufficient, and they may be arranged as follows: One from front door to kitchen; one from outside to inside of kitchen; a foot-bell from dining-room to kitchen; one from parlor to kitchen; one from second story hall to kitchen. Of course there may be a greater or lesser number according to the size and character of the building. There is no trouble in placing and putting in working order these bells, and any country carpenter with any brains at all, may, with a half an hour's study, be able to install a set of bells such as is here described. All the material can be purchased from any dealer in electrical supplies, and books of instruction may be had for the asking when supplies are purchased. Electric bells are great conveniences, and should be more used in country residences than they are, and it is thought they would be if the country contractor was only able to put them in buildings cheaply and efficiently.

An old landmark in the city of Ottawa has disappeared in the removal of the old stone building, formerly known as the Globe Hotel, at the corner of Sparks and Kent streets. It was built upwards of sixty years ago by John Burrows, C.E., of the Ordnance Department, when there was but one other stone building in Upper Town.

SEWER VENTILATION.

The following paper on the above subject, prepared by Mr. J. W. Hughes, a well-known Montreal plumber, was presented for the consideration of the members of the American Public Health Association at the annual convention of that body held in Philadelphia on the 28th ultimo:

It has for some time been accepted as an imperative requirement of a properly planned plumbing system that provision be made for a free circulation of fresh air at all times through not only the main internal sewers of a building, but also through the smaller branches known as the waste pipe, in other words, that there be no dead ends, but that each and every part of a properly planned system of sewers for a building be constantly swept by a current of air; and carrying out this principle provision is made in the planning of up-to-date public sewer systems for the ventilation of the same. The private sewers and waste pipes of a building, forming as they do but a part of the general system, should in my opinion be treated as a part of the whole; and the attempt to cut them off as is done by fitting what is known as the intercepting trap is a mistake. First, because it interferes with the basic principle of the water carriage system for the disposal of sewage, which is that the sewage should in the most rapid manner possible and without obstruction be carried from its source to its destination, yet the advocates of the intercepting trap place an obstruction (in other words a miniature cess-pool) just at the point where it will do the greatest possible injury, and obstruct the rapid carrying away of the sewage, and defeat at the start the main principle on which the system is based, namely, the rapid removal of sewage and its carriage by an ample supply of water to its destination.

The advocates of the intercepting trap claim that the improved forms of this cess-pool offer very little obstruction to the flow. Such a contention is absurd, as if they did not obstruct the flow, catch and hold the sewage they would not be traps. Again, it is claimed that the improved traps are continually washed out or scoured to a certain extent. This is true as compared with the older forms; but let any one who has had occasion to open the cleaning eye of one of these traps that has been for some time in use speak of the conditions found, and he must tell of stored-up putridity, sickening odors, and a condition of things unsanitary, not to be found even in the main sewers of the streets, and certainly not to be found in any other portion of the pipes in a building where the sewage has had an unobstructed flow.

My second charge is that it completely defeats any effectual general system of sewer ventilation by preventing free circulation of air through the whole system of main sewers and that part of them consisting of the building sewers. To offset this in part what is known as the fresh air inlet is placed between the intercepting trap and the building. This is a pipe brought to the surface and fitted with a suitable terminal; the proper name of this pipe is a "stink outlet," as when a fixture is used the rush of water from it must force a portion of the air out of the inlet, and then it of necessity becomes a stink outlet, and as a rule in cities this pipe must be so placed as to make it a dangerous nuisance even to the wayfarer, or if at a distance from the foot walk to the inmates of the building with which it is connected, as the foul air escaping from it gains access to the building it is proposed to protect through doors and windows. "But," says the advocate of the intercepting trap, "would you advise arranging pipes so that the air of the street sewers would have free passage through the pipes in a building?" To this my reply is, yes. And there is no other safe plan. People who live in populous districts must bear each and every one his part of the risks as well as sharing the benefits of the whole. No one living under conditions imposed by the concentration of large masses of people on a limited area can escape and the principle of the greatest good to the greatest number must apply.

The advocates of the intercepting trap do not deny the necessity of sewer ventilation, but they attempt to provide for it in detail instead of as a whole, and so defeat the object they wish to attain. They will tell you that the street sewers must be ventilated by having perforated man-hole covers placed at regular intervals along the line of street sewers by means of the trap, but let the main sewers have free and open connection with the street. Now as the streets of a town are the sources from which the buildings derive their greatest supply of fresh air, my claim is that such a course is wrong and insanitary. Given pure air in the streets, and there must be pure air in the buildings, the local cause of air pollution being, of course, excepted. Do away with the trap or the private sewers, continue the interior sewers of the building, full size through the roof, carrying them to a sufficient height to be well above adjacent windows; then there will be a natural circulation of air through the entire system of both public and private sewers, and the outlet from the sewers, which is acknowledged to be a necessity, will be above the general line of the house-tops, and not at the street level, as is the case when the intercepting trap is adopted. The higher temperature of the pipes passing through the building, especially in the cold season will insure this circulation at the time when it is most required. Of course there are exceptions to all rules, and there are no doubt in all cities certain places where the local traditions would call for the placing of a trap in the private sewer; such cases call for the exercise of the skill and experience of the practical plumber and the sanitary engineer. It is no more possible to lay down a rule covering every possible contingency called for in scientific plumbing and ventilating than it is to apply fixed rules to the practice of medicine. If it were there would be little need of skilled and experienced physicians. The principles of scientific medicine and plumbing are fixed, but the application of these principles calls for the intelligence acquired by education and developed by practice.

Much injury has been done by attempting to frame plumbing by-laws that will apply to every case. The conditions vary in almost every building, and to adapt the principles to the special requirements requires not only practical but scientific knowledge. If the American Public Health Association would make a study of the general principles covering this question and embody them in a code having its endorsation, leaving the practical application of these principles to those whose special duty it is to apply them, much good would result. In conclusion conditions exist in northern climates during that portion of the year when snow is on the ground that completely neutralize the effect of the perforated manhole covers over the street sewers, and during such time, in cities where the intercepting trap

is in general use, the main sewers are without ventilation, and a serious condition of affairs exists, as the building being heated to a greater degree than the outer air, has a cupping action, and draws the air from the sewers, into them, beneath the frozen and almost impervious top soil and paved roadways. Where the soil is porous, this is sure to occur, even when the buildings are situated a considerable distance away from the main sewers.

Sewers breathe! Under certain conditions the air will rush into them; again it is being expelled, with considerable force. Atmospheric conditions partly account for this, but the varying quantities of solid and liquid matter constantly entering and leaving them has an important bearing on the question. Such being the case, proper breathing places must be provided, and any attempt to bottle up the sewer air will end in failure. What place so suitable as above the roofs of the buildings, where the winds will disperse the foul gases and the light and air disinfect them.

COUNT THE COST.

Too many painters, like business men in other lines, seem to think that they must be prospering if they are only doing a large business. If they can underbid another man and succeed in getting a large contract from him they chuckle with glee, even though they have figured the price down so close that there is absolutely nothing left for profit, with the chance of coming out on the wrong side of the ledger. It seems a curious phase of the American character that this mania for doing a large business should so often be allowed to run away with good judgment, and the question of whether the business is a profitable one should be so frequently entirely overlooked. Many men, especially in the painting trade, have no idea whatever what it costs them to run their business. They figure that if they employ a man for $3 a day, and can charge $3.50 for his time, that they are making a profit of half a dollar on the work of that particular man, but they fail to take into account all the numerous items of shop expense which must be added to the wages paid to that man to get his actual cost to the employer. There is insurance, rent, interest on the cost of stock, wear and tear on scaffolds, tools, etc., brushes, cartage, telephone, shopman's wages, clerk hire, and numerous other incidentals that must be paid for, somehow, before any profit can be realized from the wages of the workman. In a shop employing an average of from ten to twelve men, these shop expenses, leaving out all question of profit to the employer, will often amount to $7 or $8 a day, or some 75 cents per man. Yet the employing painter goes blindly on, figuring that he is making a profit when he charges his customers half a dollar a day on the wages of his men. Perhaps he thinks he is covering the shop charges by the profit on material, but let him figure it up carefully, and he will find that this is seldom done. Yet he goes right along in the same old rut, taking a job for a low figure because some other painter has offered to do it for that price, without even stopping to figure whether he will make a profit or not. He argues that if the other man can do it for that much money, certainly he can. Like as not, the other man's low figure exists only in the mind of the customer who is trying to beat down the price. This is too often the reason why painters are slow or uncertain pay, and why the manufacturers do not co-operate with them more readily to grant special trade discounts, or similar favors that thoughtful men believe should be legitimately granted.—Painting and Decorating.

MR. WILLIAM SMITH.

We present herewith a portrait, accompanied by a few personal particulars, of Mr. Wm. Smith, of London, Ont., vice-president of the Dominion Master Plumbers' Association, and an enterprising member of the trade.

Mr. Smith was born in Toronto on July 27th, 1854, and received a fair education. At the age of 15 years he was apprenticed to the late Geo. Harding to learn the art of plumbing, steam and gasfitting, and served faithfully five years. After working a year as a journeyman, he decided to see some of the world, and for several years worked in many of the large cities of the United States. He then returned to Canada, and after having worked another year as journeyman, became ambitious to engage in business on his own account. With this idea, he started west, and thinking the city of London was in need of a first-class plumber, stepped off and secured a job there, and after having worked for some time as a journeyman, started business for himself. He

MR. WILLIAM SMITH,
Vice-President Dominion Master Plumbers' Association.

has now been in business for 12 years, and is classed as one of the most successful master plumbers in the Dominion. His success is attributable to honest dealing—he will not employ anything but first-class labor and material.

Mr. Smith has done the plumbing and heating of many of the large buildings in the west. As above mentioned, he at the present time holds the position of vice-president of the Dominion Master Plumbers' Association, and was vice-president of the London Local Plumbers' Association. His efforts were instrumental in bringing about the formation of master plumbers' associations in London, Stratford, Windsor and St. Thomas, and he was also one of the founders of the Dominion Master Plumbers' Association. Mr. Smith is a young man yet, and has a bright future before him. He has one of the finest plumbing establishments in the Dominion, and is proud to be the possessor of bronze, silver and gold medals secured for his superior workmanship. Mr. Smith's genial disposition and ability have secured for him honors from the Grand Lodge of Canada A. F. & A. M., as well as other fraternal organizations.

THE UTILITY OF GRANITE.

The difficulty of working granite was once notorious; indeed, for centuries the architect rather shunned this refractory material. But science has come to the rescue, and by mechanical help great results are obtained from the hardest rock. Where labor cost next to nothing in very early times, granite was selected for the images of gods, the tombs of kings, for their statues and temples, and for the monuments of great events. And in their choice of granite for their purposes the ancients were not mistaken. To this day the monuments of Egypt are almost as fresh as if just from the sculptor's chisel.

As the cost of working granite gradually decreases, we shall see more and more of it used in architectural work. It will be used in numberless instances where the wind and rain beat, and where it is so admirably adapted to withstand these influences. In this way it might prove a permanent and enduring assistance to buildings composed in other parts of more perishable materials. Granite can now be obtained of so many different shades of color that any building stone can be found to harmonize with it easily. The sculptor has tried to use granite in his art, but its mottled appearance and often faulty composition are sadly against it for his purpose. It is needless to quote churches and buildings in this country in which granite has been employed in past ages. Nearly all of them show no symptoms of decay, but in some cases disintegration, or decomposition has taken place, and this from the selection of unworthy examples of stone, for it appears that there are some granites no more proof against the weather than the poorest limestones.

Hard and compact as granite appears, it is, nevertheless, sufficiently open and porous to admit a considerable amount of moisture. By absorption it will take up nearly 1½ per cent. of water, and where disintegration takes place it is owing mainly to this circumstance. In all stones that admit water, and all do, frost—employs its terrific force and separates particle after particle till the surface is destroyed. Water conveys the chemicals which exist in the air to the interior, and by its solvent power, due in a great measure to the carbonic acid it contains, decomposes all stones. To judge of the great power exercised by carbonic acid gas as a solvent, it may be mentioned that all the silica that exists in the vegetable world (and no plant can grow without it) is derived from the stones and flints of the earth, and absorbed by the microscopic capillary cells in the roots, but the solid silica could not pass through these cells, and water, we know, will not dissolve flint.

How then is it to be accomplished? The rain that falls collects the carbonic acid of the air, and acquires the same from the soil tnrough which it passes, and in combination therewith it dissolves the flinty rock and stone, and thus conveys the necessary support to the roots of all vegetation.

In the selection of granite for enduring purposes those in which the constituent minerals are most evenly proportioned are the best. Like small paving stones each particle seems to help the other, and the smaller the grain the more completely is this the case. Large crystals of feldspar are always objectionable on account of their readiness to decompose. For ornamental purposes almost any granites are available, many affording very rich combinations of color, and if the surface be polished the weather has less hold upon it and it lasts longer. If granite be totally submerged in water and never exposed, it will last unimpaired forever, thus showing that water alone, without the agency of air and decrease of temperature to the freezing point, will not materially affect it.—The Stonemason.

ORGANIZATION AS AN ADJUNCT TO THE BUILDING BUSINESS.

The average business man seems fully alive to the value of system in conducting the details of his business; and seems to understand the importance of careful organization of all the parts in order that they may work together with the least possible friction, and therefore the greatest possible efficiency. He knows full well that disorganization and lack of system are certain to cause inefficiency and waste, and in exact ratio with the extent of their operation, cause a reduction of profits and loss of income; and still, except in very rare cases, the value of organization as a means of harmonizing the business interests of a community seems never to occur to him.

The customs that have grown into existence through neglect and disorganization in the building business are a constant demonstration of the crying need of organization, and yet the experience of the National Association up to the present time demonstrates the fact that builders throughout the country have largely failed to comprehend either the character, latent possibilities, functions, or results of organization.

Such local exchanges as have in any degree applied the true principles of organization which it has been the constant effort of the Association to define, have demonstrated in corresponding degree the value of organization, and, through the operation of such principles, have come to understand in a measure the benefits growing out of concerted endeavor; but in so far as exchanges have failed to apply these principles, they have demonstrated failure to appreciate the results which must inevitably follow their application to the conduct of business affairs.

Correspondence with the National Secretary is indicative of the fact that builders have so little knowledge of the benefits of organization that the subject fails to excite their interest unless some pressing need or emergency confronts them. Questions are daily asked, the answers to which were printed by the National Association five years ago, and placed in the hands of all its members individually, as well as in the hands of builders generally throughout the country.

In the minds of the majority of the builders throughout the country the value of organization is limited, apparently, to combination for the purpose of resisting attack by forces too strong to be controlled by the individual. In operation, builders have largely limited its work to affairs of the moment, and for the enforcement of conclusions in the main obstructive rather than constructive. The power in organization for the correction of evils which daily menace builders, and for defining the principles upon which their business should be conducted, thereby anticipating and obviating the difficulties which are now left for settlement till the friction point has been reached, is practically lost sight of.

The truth of the axiom, "Prevention is better than cure," is accepted the world over, and builders should recognize that in organization lies their only hope for the comprehensive and efficient application of this

principle. This power, which is applicable to every condition under which the building business is transacted, lies fallow at the present time because of failure on the part of those most interested to understand the great importance of preventing evil conditions rather than curing them after they have gained foothold. There is no condition to which the building business is subject which is not capable of beneficial treatment by united action on the part of the builders; organization presents the means for united action, and out of the solidity thus obtained beneficial results must inevitably follow. — Bulletin of the National Association of Builders.

THE LIAR AND THE CONTRACTOR.

FROM a compilation of proverbs in all languages, those referring to the liar number 101. We were seeking a proverb that would fit the case of the liar as he is known at contract-lettings for stone work on public buildings. No. 85 in the list seems to most forcibly express an idea we had in mind to write about. It reads: "The credit got by a lie lasts only till the truth comes out." This fits us for a text. The contractor who secures a job by misrepresenting the actual quality of material, or the character of the workmanship he pledges himself to put into the structure, holds credit "only till the truth comes out," and that usually makes its appearance before the contractor "hangs up his fiddle and the bow," and retires from active business life. We might cite the career of more than one stone contracting firm to prove that it doesn't pay to be a liar, and he solicitous at the same time to secure other contracts. The evil they have done lives after them. On the other hand, the reputation of the honest contractor precedes him, and where he has to deal with honest men on boards he is likely to succeed if he can make figures to come within the appropriation. A notable incident illustrative of this point is fresh in the minds of stone contractors, where the record of what the successful contractor has done in an honest way for many years was of itself sufficient to put to rout the half dozen slick workers combined against him. — Stone.

Mr. W. G. Elliott, of the firm of Elliott & Phin, contractors, Brantford, has lately purchased an interest in the firm of Workman & Watt, brick manufacturers, of that city. The name of the new firm will be Workman & Elliott. They will manufacture red and white brick and other materials. Mr. Workman has also joined Mr. Elliott as a partner in his contracting business, the firm name being Elliott & Workman.

WANTED TO ADVERTISE HIS TRADE.

A VERDANT youth dropped into a jeweler's, and after gazing at some fraternity pins in the show case, said to the proprietor:

"Them's mighty nice breastpins you got there, mister."

"What kind of a pin would you like to look at?"

"How much is this one with a pair o' compasses and a square?" pointing to a Masonic pin.

"Five dollars."

"Five dollars, eh! You haven't got one with any handsaw on it, have you. I'm just outer my time, and as I'm going to set up as carpenter and jiner, I thought I'd like to have somethin' to wear, so folks would know what I was doin'. Well, I'll take it, though I'd like one with a handsaw, but I guess mebbe that's plain enough. The compasses is to mark out your work, and the square is to measure it when marked out, and any durned fool knows G stands for gimlet."

Excess of water in a concrete mixture is bad practice, as only a fixed equivalent of water can chemically combine with cement. The surplus water simply displaces so much of the solid contents of the mass and leaves voids after it has evaporated. This makes the hardened concrete porous so it will absorb moisture; this is a source of great weakness, as the water held in the interstices during frosty weather expands and thus the cement begins to show cracks or other defects.

In the United States there are State boards of arbitration. The master builders of Boston are not afraid to declare that the board before whom their disputes are brought is unfair, untrue and disposed to suppress facts. As the master builders have advocated the principle of arbitration, they now suffer like the engineer who was "hoist with his own petard." "We do not relish," they say, "the misrepresentations and the patronising suggestions which the State Board of Arbitration sees fit to publicly visit upon us, even after they have been given the fullest and freest information as to our functions and purposes, and as to the efforts which we have been making toward securing peaceful solution of labour troubles. If this sort of treatment by a board which is expected to be fair and dispassionate is thought to be in the line of conciliation, then we do not properly understand the term. There is something wrong, either in the system or its administration, something that militates seriously against any great good to be secured by and through this expensive department of the State." The law courts are likely to sympathise with the master builders, for they cannot approve of new fangled processes for ascertaining the truth.

HEATING DEFECTIVE BUILDINGS.

SOME buildings are so badly constructed that it is impossible to warm them to a temperature of seventy degrees Fahrenheit, the outside temperature being below zero. When surveying a building for the purpose of making a proposition to heat it, its construction should not be overlooked, says Domestic Engineering. Outside brick walls are sometimes plastered upon the brick. A construction of this description is difficult to heat. It will require a very large heating apparatus to warm a room with walls of this description. The cooling effects of these walls require an abundance of hot air to overcome—in fact, it is not overcome with the ordinary furnace work of the present day. Outside stone or brick walls should be lathed upon strips of wood not less than one inch thick, so that an air space may be left between wall and plaster. This will insure a dry and comparatively warm wall, reducing to a large degree the loss of heat that must necessarily take place in a building with exposed walls plastered upon the brick.

Loose fitting doors and windows, a common fault in cheaply constructed buildings, is another cause of failure in house heating. This defect, like the cheap built wall, cannot be laid at the door of the heating contractor, but when he draws the owner's attention to these defects and lays the blame for the non-fulfillment of his guarantee upon the bad construction of the building, he is told that he had an opportunity to examine the building and accepted it in its present condition, therefore he must carry out the guarantee and warm the building as agreed. This is a state of affairs to be avoided, for there is no way out of a difficulty of this kind that does not entail loss and trouble to the furnace man and considerable annoyance to his customer.

It is perhaps impossible to do a heating business and have easy sailing all the time. Heating men do not expect it, for let them do their work ever so well, there are cranks to be dealt with who would not be satisfied with the best job that money can purchase. Failure in heating buildings is caused by men doing a heating business who are deficient in knowledge of the requirements needed to make a successful heating system, and by experts in the business, through being too hasty in their examination of a building or too eager to close a contract, taking the job at a low figure and trying to carry it through at a profit, with the usual results—an unsatisfactory heating plant and a condemned furnace.

Mr. Geo. McArthur, a builder of St. John, N.B., is credited with having recently erected a brick building, 60 x 24 feet, two stories and basement, ready for roofing, in thirty-two hours.

The City Council of London, Ont., have under consideration a plumbing by-law, which provides that the inspector shall be paid by fees. The City Solicitor having given it as his opinion that the Council had no power to provide for payment of the inspector's services otherwise than by stated salary, the Legislature is to be asked to grant the necessary authority to have the inspector paid by fees.

The granite cutters on the new legislative buildings at Victoria, B.C., recently went on strike because some of the workmen were given "piece-work," and also because of the employment of American labor. The contractor states that he only employed foreign labor when the necessary number of granite cutters could not be obtained in the local market, and that the men who were given piece-work were incapable of earning the rate of wages demanded by the unions. The dispute has been laid before the government.

ESTIMATING RADIATOR SURFACE.

JAMES Keith, C.E., London, gives the following information for estimating the amount of pipe or radiating surface required to maintain the temperature of rooms by hot water, for direct radiation and where no special artificial ventilation is arranged for:

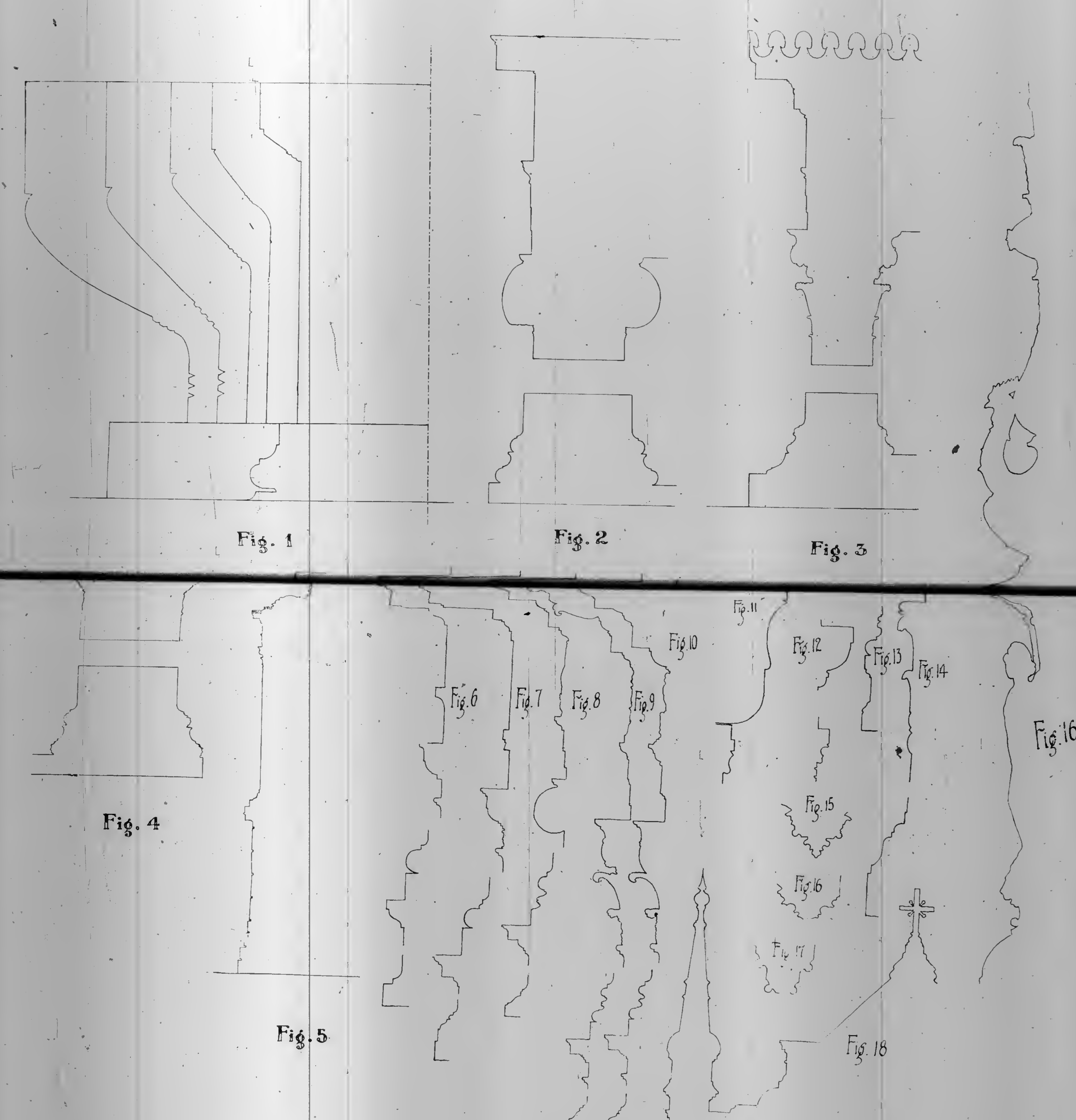
"Divide the difference in temperature between that at which the room is to be maintained and that of the outside atmosphere, by the difference between the temperature of the pipes or radiators, and that at which the rooms are to be kept; and the product thereof will be the square feet or fraction thereof, of pipe or radiator surface to each square foot of glass or its equivalent."

e. g. Assuming the average temperature of pipes to be one hundred and fifty degrees Fahr., while the outside temperature is thirty degrees, and the room is to be kept at seventy degeees, we have:

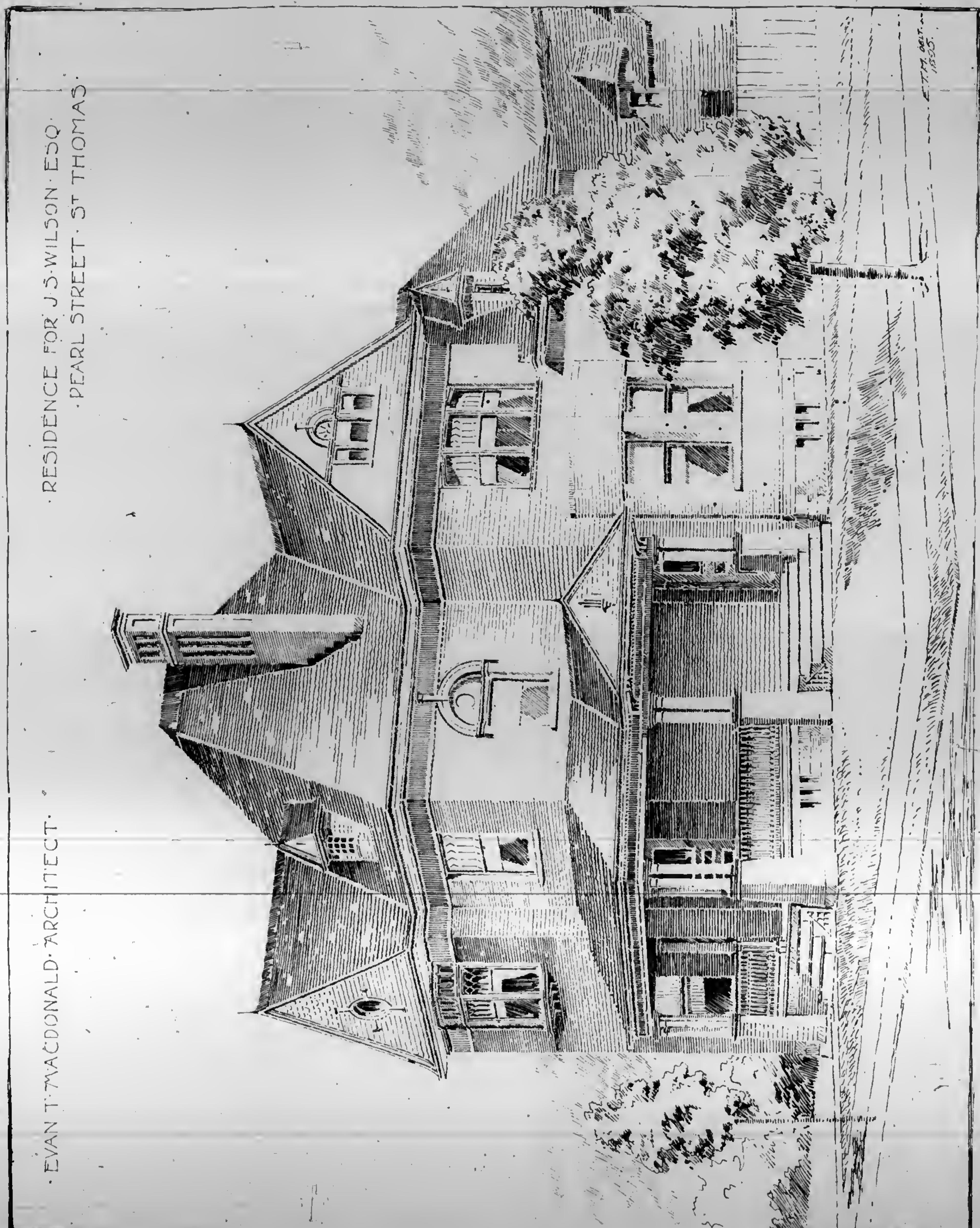
Room minus outside = Difference in temperature.
70 deg. - 30 deg. = 40 deg.

$$\left\{\begin{matrix} 150\text{ deg.} - 79\text{ deg.} \\ \text{Pipes} \quad \text{Room.} \end{matrix}\right\} = \frac{40}{80} = 5 \text{ or half sq. foot.}$$

Therefore, about one foot of two inch pipe to every square foot of glass, or its equivalent, will be required to maintain a difference of forty degrees; about twenty-five per cent. to the total being added for safety.



SKETCHES ILLUSTRATING MR. JOS. VENNE'S PAPER ON "THE ÆSTHETIC VALUE OF MOULDING AND PROFILE," IN THIS NUMBER.



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TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Our New Year Number.

ARRANGEMENTS are well under way for the publication of the New Year Number of the ARCHITECT AND BUILDER for 1898. The general character of these numbers has become so well known that concerning the one on which we are now engaged, it need only be said that we are striving to make it quite as attractive and interesting as its predecessors, and if possible more so. As usual an edition considerable larger than the ordinary one will be printed, and copies will find their way into the hands of many persons outside the list of regular subscribers. The building outlook for 1898 is brighter than for several years past, and those who have announcements to make regarding materials and appliances adapted to the requirements of architects and contractors in all lines should immediately arrange for space in the advertisement pages of this New Year Number. The announcements of yearly advertisers will appear in this number at no extra cost.

An Important Competition.

THE prospectus which has been issued outlining in a general way the requirements in the proposed competition for plans for the University of California, is well calculated to awaken the enthusiasm of architects in the project. The programme containing the details of the competition, prepared by Prof. Gaudet, of the School of Fine Arts, of France, is now overdue, although we have not yet seen a copy. When printed, copies may be obtained from the architectural societies of America and Europe or on application to the Trustees, at No. 217 Sansome street, San Francisco, California. It is intimated in the prospectus that ample prizes will be provided and that "there are to be no definite limitations of cost, materials or style"; all is to be left to the unfettered discretion of the designer; he is asked to record his conception of an ideal home for a university, assuming time and resources to be unlimited." It is further stated that "while the method of obtaining the architectural plan has not been decided on in detail, it is thought that it will be done by an international "concours," open to all the architects of the world, with an international jury of five members, who will have full charge of the "concours" and of the award of all the prizes." Without knowing the details of the scheme, it is clearly apparent that it would be useless for any architect to dream of engaging in this competition unless he is possessed of ability of the highest order, backed by large experience and the necessary means to enable him

to give ample expenditure of time and money to the project. Such being the case, the best results would seem likely to be achieved by restricting the competition to architects in America and Europe who can meet these requirements.

Effect of Limestone on Metal.

GREAT importance attaches to the statement made by Mr. L. L. Buck at the last meeting of the American Society of Civil Engineers, that deep corrosion results from the contact of limestone in concrete with metal. This fact is said to have become apparent in the anchorage of the railroad suspension bridge at Niagara, the main cables of which are imbedded in a concrete made of limestone. The discovery was recently made that at the points of contact between the spalls and the wires, the latter were badly corroded and in some instances entirely severed.

Signatures of Architects on Buildings.

IN Belgium it has become the practice for architects to inscribe their names in small capitals at the right hand corner of the principal front of their buildings. To the younger members of the profession in that country is ascribed the credit for the introduction of this practice. The interest taken by the Belgians in architecture, and their ability to discriminate between good and bad work, has had much to do with bringing the practice into general use. A prominent Belgian architect wishes that there should be a regulation making it compulsory upon architects to "sign" their buildings, in order that the designer of monstrosities might soon find his occupation gone.

Building Disputes.

FIVE years ago the City Council of Boston appointed a board of appeal, to which disputes arising between architects, owners or contractors and the City Building Department, are referred for settlement. The board is composed of an architect, a builder and a lawyer. Nearly 200 cases have come before it for adjudication. The success which has attended its deliberations and conclusions can be judged by the fact that in only one or two instances have appeals been made to the courts from its findings. The establishment of such a board in every city of importance would be of great advantage to architects and builders who in the absence of such a body must in all cases submit to the Building Inspector, whose decisions may or may not be founded on common sense and a correct knowledge of the building laws. It would also be the means of effecting a considerable yearly saving in law costs, not to speak of the time and worry incident to proceedings in the courts.

Fireproof Construction for Mercantile buildings.

MR. W. L. B. Jenney, the well known architect of Chicago, recently presented a somewhat lengthy paper on this subject before the Chicago Fire Underwriters' Association. Having given due consideration to all available data, including the lessons taught by the recent fire in the Horne and Methodist Book Buildings at Pittsburgh, he suggests as the best method of rendering a mercantile building fireproof, a steel construction with an adequate foundation, the exterior walls of brick with terra cotta trimmings; the fire proofing and the floors to be of porous terra cotta that has been thoroughly tested, or with concrete strengthened with square rods twisted; the floors to be of smooth concrete; the doors to be of metal. These doors can be ornamental or as plain as desired. Mr. Jenney is of the opinion that in such a building the stock can be entirely consumed with but little injury to the building other than smoking the walls and ceilings and the blistering of the paint, and that if the building is protected from external fires by outside shutters then the windows will be destroyed, but if there is no danger from outside fires the shutters can be on the inside of the building, and if closed will save the windows. The author states that when substantial iron window frames and sashes shall be available, as probably they soon will be, the loss to the building will be little more than the glass, the interior painting and calcimining. For the preservation of the contents of the building strictly fireproof division walls, with shutters to all outside openings where there is danger from other buildings, and to light shafts and stairways connecting the different stories of the building, are recommended. It is claimed that if these methods are intelligently applied, they will add but a small percentage to the cost of the usual fireproof building.

The Manufacture of Cement in Canada.

TRADE statistics show that although the production of Portland cement in Canada increased by 154 per cent. between the years 1894 and 1896, there remains a wide gap between total production and demand in the home market. During the fiscal year ending June 30th, 1896, the importations of foreign manufactured cement into Canada amounted to 210,065 barrels, valued at a quarter of a million dollars. The use in recent years of concrete for foundations for street paving, as well as in the construction of sidewalks, basement floors and for many other purposes, has greatly increased the demand for cement. Inasmuch as this increase in demand seems likely to be a permanent one, there appears to be room for a large extension of our cement manufacturing facilities. The annual reports of the United States Geological Survey contain evidence of the exceedingly rapid growth in recent years of the cement manufacturing industry in that country. In 1890 there existed sixteen factories, having a total capacity of 335,500 barrels of Portland cement; in 1894 the number of factories had increased to twenty-four, and the total production to 798,755 barrels; in 1896 twenty-six factories produced 1,543,023 barrels, showing a greatly enlarged capacity; the number of factories has now reached thirty, and the estimated production for the current year is 2,304,000 barrels. These figures would appear to indicate that home manufacture in the United States has more nearly kept pace with the requirements of the home market than has been the case in Canada. The present companies are entitled to much credit for the courageous manner in which they invested capital in an industry which many averred could not be successfully conducted in this country. These companies have overcome one difficulty after another, until at the present time they are able to produce cement which is in every particular the equal of what can be made abroad. One of the greatest obstacles which they have had to encounter has been the prejudice existing in favor of the foreign made article. The reason of this prejudice is to some extent obvious from the fact that until within the last ten years our total supply of Portland cement was imported from abroad, as up to that time no attempt had been made to manufacture in this country. As everything must have a beginning, it is most unfair to men with enterprise who seek to add to the number of home industries, that they should find such difficulty in securing a fair comparison of the quality of their goods with those of foreign makers. It is greatly to be regretted that the government, acting no doubt on the advice of their engineers, have from year to year specified the use of foreign cement in the construction of public works in the face of the existing evidence that the Canadian article is equally good. Fortunately there is no lack of material in Canada for the manufacture of both Portland and natural cement, and the enterprise of our people should speedily bring our manufacturing capacity up to the point where at least the total demand of the home market can be supplied. When that point shall have been reached, we trust it may be found to be possible to manufacture for export also.

Results of Strikes.

THE recent gigantic strike of workmen connected with the engineering trades in Great Britain serves to show the far-reaching injury which results from conflicts of this character, precipitated in many instances by thoughtless or selfish demagogues in the ranks of the labor unions. Apart from the injury and hardship which have noticeably been the outcome of such conflicts in the past—as, for example, disorganization of trade and privation to the families of the workmen—new and more far-reaching effects have manifested themselves in connection with the recent struggle. The iron manufacturing industry of Great Britain was so paralyzed that foreign orders for machinery, etc., could not be supplied with the required promptitude, and in consequence were in many instances transferred to the manufacturers of the United States and other countries. In all probability many of these orders have gone from the British manufacturer never to return. British manufacturers are also being placed at a serious disadvantage in competition with those of other countries by reason of the working rules imposed by the unions. One of these is, that a workman shall not attend to the operation of more than one machine. In these days of automatic machinery, a workman, if given liberty of action, could easily attend to two or three machines. He is forbidden, however, to give attention to more than one. Should this one occupy but a quarter of his time, he must idle away the remainder. This is the method by which the unions seek to limit production and provide employment for their members. In their anxiety to gain this end they seem to have entirely disregarded the fact that their employers are obliged to meet the competition of the world, and that to do so they must be able to produce their goods as economically as their rivals. If the British manufacturer is obliged to employ three workmen to do the work which the American or German manufacturer gets done by one, the foreign trade which he formerly controlled to so large an extent will pass from him into the hands of his competitors, and the British workman will find his occupation gone. The situation is already a most serious one, and it is to be hoped, before it becomes too late, steps will be taken to apply a remedy. If the labor agitators are unable or unwilling to see how short-sighted is the policy which they are pursuing, legislation should be enacted which would prevent them from bringing ruin upon individual interests and the commerce of the nation. We again express the belief that the promoters of strikes will yet carry their despotism to the point where the public sense of justice will assert itself and deprive them of the power to exercise tyranny over their fellow-workmen and employers to whose enterprise they are indebted for most of the comforts of life which they enjoy.

The Pennsylvania State Capitol Competieion.

REFERENCE was recently made in these pages to the action of the State Commissioners of Pennsylvania in repudiating the recommendations of their expert advisers in the competition for designs for a State Capitol building to be erected at Harrisburgh, Pa. Allusion was also made to the fact that an injunction had been applied for by some of the competing architects to restrain the Commission from carrying out their expressed intention to hold a second competition on conditions of their own choosing. We have now with regret to announce the failure of the legal proceedings to obtain redress for the wronged competitors. The Supreme Court, taking a strictly legal view of the case, and disregarding entirely its moral aspect, has decided that the Commissioners had no authority to enter into agreement with architects as to conditions under which they should submit designs in competition, and that consequently the State cannot be legally bound to recognize and fulfil these conditions. This decision may correctly represent the strictly legal interpretation of the matter, but the competing architects had a right to presume that the conditions of a programme signed by the Governor of the State, the acting Speaker of the Senate, the Speaker of the House of Representatives, the State Treasurer and the Auditor-General would be in no danger of repudiation.

ILLUSTRATIONS.

PLANS SHOWING HEATING, PLUMBING AND VENTILATING SYSTEM, NEW MUNICIPAL BUILDINGS, TORONTO.—E. J. LENNOX, ARCHITECT.

KNOX CHURCH, WOODSTOCK, ONT.—BURKE & HORWOOD, ARCHITECTS.

THE church is built of dark purple Toronto bricks trimmed with brown stone. The window openings are of moulded brown bricks. The auditorium is of amphitheatrical form, with the roof of single span. The school at the rear is polygonal in form, with radiating class rooms. The work was carried out under the superintendence of Mr. Alexander White, of Woodstock, and cost about $45,000.

PERSONAL.

Mr. Robert W. Waddell, C. E., of Kansas, formerly of Cobourg, Ont., was married on November 24th at Peterborough, to Miss Elizabeth Vair, of Belleville.

Mr. H. J. Powell, architect, of Stratford, has recently entered into partnership with Mr. L. C. Wideman, of Guelph. The firm have opened an office in Guelph.

Mr. R. J. Fawcett, architect, has recently removed from Petrolea to Sarnia, where he will make his headquarters in the future. A branch office will be maintained at Petrolea.

Mr. J. A. P. Waddell, C. E., who recently delivered a course of lectures on bridge engineering at McGill University, Montreal, has received the appointment of consulting engineer of the Boston Elevated Railroad Company.

A London despatch of Nov. 18th announces the death of Sir Henry Doulton, head of the celebrated firm of Doulton & Co., pottery manufacturers. The deceased gentleman initiated the manufacture of sanitary pipe making in 1846, and in 1870 commenced the manufacture of art pottery.

ATTEMPTED BOYCOTT OF CANADIAN JOINERY.

An effort has been made by the Amalgamated Society of Carpenters and Joiners of Great Britain to boycott Canadian and United States joinery. This society recently issued a circular to its members requesting them not to fix or use foreign joinery, and drawing special attention to the importation of doors, windows, etc., from America, which they claimed were manufactured under unfair conditions and by ill-paid labor. Several weeks were granted before the injunction was to be put in operation, but on a certain date the members were, in substance, instructed to band together to prohibit the importation of such joinery.

For many years large quantities of manufactured joinery have been exported from Canada and the United States to Great Britain, and this is, we believe, the first organized effort that has been made to restrict importation. The consequences, however, are not likely to be serious, as the trade has now become too well established to be permanently injured by the selfish and ill-advised action of a trade organization.

Before taking such a step, it would have been well had the society endeavored to ascertain the actual facts and conditions. We will consider only the conditions as they exist in Canada, and in this connection will endeavor to prove that Canadian doors, to which particular reference is made, are manufactured under proper conditions, and not by inferior workmen employed at low wages.

By an act passed by the Ontario Legislature on May 5th, 1894, and which is now in force, provision is made for the appointment of councils of conciliation and arbitration for settling industrial disputes arising out of the price to be paid for labor, disagreement with respect to wages, number of working hours, insufficient or unwholesome food supplied by employers, and ill-ventilated or dangerous workshops or places of accommodation. Whenever a complaint arises these councils visit the locality and obtain all particulars of the case. The Ontario Factories Act provides, among other things, that no girl or boy under fourteen years of age shall be employed in any factory, that every factory shall be kept in first-class condition as regards cleanliness, and that proper ventilation be provided. These provisions are generally complied with, and very few complaints are received by the inspectors.

Regarding the wages in our wood-working factories, we have ascertained the average wage paid by several sash and door manufacturers in Canada. One of the largest exporters to the British market writes that the range of men's wages in the factory is from $1.00 to $2.25 per day of ten hours, according to character of work and skill of workman; another that from $1.50 to $1.75 is the average; and another that $1.50 would be about the correct figure. In addition to the adults employed, there are some apprentices learning the trade whose wages would average from 50 cents to $1.00 per day. This would give an average of nearly $1.60 per day for adults and 75 cents for apprentices. Four other firms who manufacture largely for the local trade, but who have also exported doors to Newfoundland, the West Indies and South America, give the average scale of wages as follows: No. 1—$1.50 to $1.80 per day; No. 2—$1.60, $1.75, $1.80 and $2.00 per day; No. 3—$1.25 to $2.00; No. 4—9 first-class joiners, $12 a week; 37 very good, $11; 63 good, $10; 61 pretty good, $9; 49 common, $8.00 to $8.50; 26 3rd year, $7.50; 31 2nd year, $6.00 to $7.00; 19 1st year and apprentices, $3.00 to $5.00. The above figures give an average of $1.60 per day. It must also be remembered that most of the factories are operated the year round, and consequently the average is lower than would be the case if operated only during the building season. For living accommodation the cost in the localities in whicn the factories are located is not above three dollars per week.

We think the above figures should convince the most skeptical that Canadian doors are manufactured by properly-paid labor and under fair conditions. The average scale of wages compares favorably with that paid in other lines of industry, and we believe that nowhere in the world are laborers given greater remuneration for their services than in Canada, and nowhere does greater harmony exist between capital and labor. The rights of our workmen are respected, and protected by law. The absence of serious strikes is an evidence of the fact that the conditions are such as we have described.

The secret of our success in competing in the British market against home-made joinery is not to be found in the price of labor, but rather in the skilful manipulation of our raw materials by means of improved machinery. England is the great manufacturing nation of the world, but unfortunately she is compelled to import her raw material. Hence Canada, with her forest wealth, becomes a competitor in manufactured joinery, and the country producing the goods at the smallest cost naturally captures the market.

A visitor to some of our woodworking factories will at once be impressed with the marvelous work accomplished by machinery, by means of which the productive capacity is greatly increased and the quality of the work improved as well. This increased capacity enables the Canadian manufacturer to produce the goods at the smallest possible cost. These are the advantages that have enabled our manufacturers to successfully compete with those of Great Britain.

It is unfortunate that a greater distinction is not made in foreign countries between Canada and the United States. Even in our mother country there is much ignorance regarding Canada. In this may be found the cause of the present protest against Canadian doors, as we understand there was much dissatisfaction with a large consignment of doors that were imported into England from the United States, and which were found to be of very inferior quality. It is possible, also, that Canadian manufacturers are suffering somewhat from the reputation for the sweating system that is reported to exist in some portions of the United States, where female labor is said to be employed in door-making. There is also much antipathy in England to goods made in United States prisons for export, as well as on account of the bitter opposition of American employers to trades unions. In Canada, however, no such conditions exist, and our manufacturers would do well to adopt some means by which foreigners would cease to confound Canada with the United States. This might be done by stamping on all our goods the words "Made in Canada," after the manner of German manufacturers.

Mr. Routhier, architect, of Ottawa, is giving a series of instructive lectures on Architecture at the Canadian Institute, in that city.

BY THE WAY.

On the 2nd inst. a Masonic service was held in St. Paul's Cathedral in London in commemoration of the two hundredth anniversary of the opening of that noble edifice. The sermon on the occasion was preached by the Bishop of London, as was the first sermon by Bishop Compton.

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In noticing the numerous effective sketches of ancient work appearing in the pages of the catalogue of the T-Square club, of Philadelphia, the London Builder makes the candid admission that "in the matter of architectural drawing the Americans are beating us, if they have not done so already."

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It is a common practice for thieves to enter vacant houses and carry off lead pipe and other plumbing fixtures. A case came under my notice the other day where a theft of this character was perpetrated in broad daylight on one of the fashionable residential streets of Toronto. Architects, builders, owners and agents of property and others interested may take a lesson from an ingenious contractor of New York who has adopted the plan of placing, each evening, at one of the street windows of his building a dummy watchman, in the same manner as the farmer fixes a scarecrow in his corn field. The watchman is apparently leaning against the window casing and looking into the street. In the daytime he disappears, and a curious inhabitant of that neighborhood, who questioned the contractor about it, was informed that the scarecrow saved him a dollar a night.

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Of the authorized expenditure of 100,000,000 francs in connection with the Paris Exhibition of 1900, about 62,000,000 francs will be absorbed by architectural and engineering works. The two palaces on the Champs-Elysees, devoted to art will cost 20,000,000 francs. The large palace in the Champ-de-Mars will cost 18,000,000 francs, the buildings on the Esplanade of the Invalides 5,000,000, and the small buildings along the quays 1,600,000 francs. Bridges and other communications across the Seine, including the Pont Alexandre III, are put down for 5,000,000 francs, while the works for utilising the river will cost 3,000,000. It is estimated that mechanical and electrical power will need 6,750,000. The circular railway is to cost 1,500,000 francs. In this connection mention may be made of the fact that it is proposed to hold an International Congress of Architects at Paris during the progress of the great Exhibition.

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Happening, a few days ago, to glance out of my office window, in the direction of the new Toronto municipal buildings, I saw a workman sliding down a rope from the top of the tower. The great risk of such a proceeding was so apparent that I could not believe the act was performed by instruction from the architect or contractor in charge of the work. I therefore applied to one of the principal contractors for the facts, and was told that the act was the result of the man's own foolhardiness. The contractor further stated that on two occasions he had taken the trouble to expostulate with the man, but his warnings had been disregarded. This foolish recklessness recalls an incident which occurred nearly a quarter of a century ago at the St. Lawrence market building on King street east, Toronto. A painter, proud of his agility, in spite of the remonstrance of his employer and friends, insisted on climbing to the top of the dome of the building to put a few finishing touches to the flag staff. He safely arrived at the spot where the work was to be performed, but in reaching out with one hand for his paint pot, lost his balance and fell from point to point of the roof until he lodged behind a chimney. When some of the spectators reached the spot from the street below, they found the man's lifeless body. When the unavoidable risks connected with the erection of buildings are so great as to demand special legislation to insure precaution on the part of employers and employees, what shall be said of workmen who deliberately take their lives in their hands in the manner to which I have referred?

UNION INFLUENCE ON PUBLIC BODIES.

Mr. Meathe, President of the National Association of Builders, in his annual address before the recent convention of that society, expressed himself as follows:

"As each year seems to decrease the profits in all business, especially in ours, there seems to be on the opposite an increase of obstacles, mainly those brought on by labor unions. While it is the right of all trades, no matter what they may be, to organize to accomplish something the individual can not accomplish, still they have no right to prevent others from earning their living because they are not members of their organizations. I speak of this to-day because in our fair city we have municipal boards, organized under the laws of the State, who have the audacity to put into the terms of their contracts that none but union labor should be employed on that work, thereby discriminating against those who are citizens and tax payers, whose conscience will not permit them to be members of any orgaaization.

"While such a contract is not valid, yet it shows that there is creeping into our municipal boards a species of demagoguery which bodies organized as ours should take cognizance of, and in justice to ourselves we should enter an earnest protest. How would it sound to those gentlemen who comprise a portion—I am sorry to say they are in the majority on those boards—if those contracts read that none but members of the Builders' Exchange could build their edifices? The labor unions would be up in arms if such were the case, and justly, too. They might as well put in their contracts that we should employ none but red-haired men or men of a particular denomination. It is a pitiable spectacle, indeed, to see men, reputable gentlemen, whose oath of office is to obey the laws of the State, willingly violate them for the purpose of gaining votes."

PUBLICATIONS.

We are indebted to the publisher, Mr. Wm. T. Comstock, 23 Warren street, New York, for a copy of the fourth annual edition of the Architects' Directory. The price of the book is one dollar.

The pictorial calendar of the Toronto Art League, has won its way into the affections of lovers of art to such a degree that its reappearance is eagerly looked for. In the calendar for 1898, which lately reached our table, the high standard of artistic excellence of previous years is well maintained, while the motif of the work differs entirely. The drawings are suggestive of the every day life of the past in Canada, and to the mind of the older generation of Canadians will serve to recall a host of memories connected with pioneer days in this country. To the younger generation they will convey a vivid impression of the obstacles with which their sturdy forefathers had to contend in laying the foundations of our present civilization.

THE NEW MUNICIPAL BUILDINGS, TORONTO.

In the Canadian Architect and Builder of October, 1888, was published the first illustration of the new municipal buildings at Toronto. These buildings, which at that time had their only existence in the mind of the architect and on paper, are to-day an almost completed structure, in the Romanesque style, massive and imposing, yet graceful and pleasing in color and design.

Pursuant to a purpose formed several months ago, we present to our readers in the present number, photographic reproductions of the architect's plans, showing in detail the heating and ventilating systems, accompanied by letter press description of the same, and some particulars of the structure as a whole, which we hope to supplement at a later date.

We can do little more than briefly touch upon the history of the enterprise. When the agitation for proper accommodation for the various municipal departments first arose in 1880, the purpose was to put up a building which should meet these requirements only. After the purchase of the site at the head of Bay street at a cost of $210,000, and the acceptance of the competitive design submitted by Mr. E. J. Lennox, the whole question was reconsidered in 1887, and it was then decided to provide a building for joint occupation by the city and county officials. The estimated total cost of the property, based on tenders received from the various trades, and including cost of site, furniture and architect's fees was $1,632,034.

The contracts were signed by the mayor on behalf of the city in August 1889, and in September, following, the contractors for the masonry, Messrs. Elliott & Neelon, took over the building, and remained in charge for three years, when they were dismissed by the architect on the ground that they were using an inferior grade of stone, and in other respects were not fulfilling the terms of their contract. The courts having sustained the action of the architect, the latter then took personal charge and proceeded with the work by day labor.

The buildings front on Queen, James, Albert and Terauley streets, the principal facade being on Queen street, with the chief feature, the tower, in a direct line with Bay street. This tower is 35 feet at the base and will rise to a height of 260 feet.

The main entrance is formed of three large arches, supported by clusters of columns, the whole being elaborately carved. There is a main entrance to both the east and west facades, flanked by small towers 16 feet square and 100 feet high, relieved by windows and ornamented. The north facade, while in keeping with those of the south, east and west, is plainer in character, and contains the entrance to the police court.

The eastern wing will contain the city offices and the western wing the county offices. At each entrance to the ground floor of both wings, and on both sides of the hallways there are handsome staircases, with marble treads and landings, wrought-iron grille balustrading and nickel-plated hand-rails. The main hallways will be finished with marble dados and tile floors, and the remainder trimmed in polished oak. The ceilings are richly panelled.

On the second floor is the city council chamber, 50 × 40 feet, the ceiling of which, in one span, is 30 feet in height, extending through two stories. On the corresponding floor on the county side of the building are four court rooms. The third floor on the city side affords accommodation for the officials of the Public School Department. On the county side this floor will be devoted to reading rooms and law libraries and janitor's quarters.

Since the first inception of these buildings two different sets of plans and specifications have been prepared by the architect, E. J. Lennox, for the heating and ventilation. The first set was prepared in 1887. As there was at that time a strike in progress in the plumbing and heating trade, and it was expected that there would be many developments and improvements in connection with this work by the time the building would be ready for it, the Council wisely decided that it would not be advisable in the interests of the city to take tenders at that time. The complications that were likely to arise, and the large additions that would necessarily require to be made to the original contract, if let at that time, in changing the system to comply with the modern requirements of the times, after the work was let, would not be in the best interests of the city. An approximate estimate was therefore obtained for heating, plumbing and gas fitting, of the best description at that date, which aggregated $80,000, and was for a low pressure gravity system of direct and indirect heating, without provision for steam power of any kind.

After the acceptance of the original tenders, nothing further was done about estimating upon the heating, plumbing, etc., work, until the Fall of 1896, when the architect, Mr. E. J. Lennox, was instructed to prepare new plans and specifications for the very best and most approved system of heating, plumbing, gas-fitting and electric lighting, and other requirements that had come into existence in connection with these branches since the building had been in progress, thus bringing the building up-to-date in these particulars.

The preparation of plans and specifications for this work in a large building such as the New City Hall and Court House, to combine all the latest improvements in heating, ventilation, plumbing gas-fitting and electric lighting, etc., so as to reduce the cost of operation to a minimum, was a work of no small moment. It meant to say the least many months of careful calculation and investigation, and in this connection it should be said that, judging from an inspection of the work at the building and from the drawings and specifications, the plans and specifications published in this number have never been surpassed, if equalled, for completeness by those of any large building in Canada. Indeed they appear to be as near perfection as possible for contractors to estimate upon. This is conclusively proved by the fact that although the lowest tender amounted to the sum of $187,000, the highest acceptable tender was only five or six thousand more, and it has been stated time and time again by contractors who figured on the work that the plans were the most complete, accurate and easily figured on of any they had ever seen, facts which certainly speak well for the care exercised by the architect in their preparation.

We propose to give here a short resumé of the plans and specifications as finally adopted by the City Council for the heating, plumbing, ventilation, gas and electric wiring, and other work of the building as now being carried out under contract by the Bennet & Wright Company, Limited, under the direct supervision of the architect, E. J. Lennox.

A glance at the plans in our illustration pages will give a fair conception of the magnitude of the work, but a far more explicit idea could be given if space could be spared to fully set out the specifications in as comprehensive a manner as the plans would indicate.

For this system there have been constructed large boiler and machinery rooms situated below the level of the ground in the court yard. The location of these rooms was decided upon, the architect informs us, for several reasons—first, on account of fumes, gases, dust, etc., which rise from a plant of this size, and which, if the plant were located in the basement, would work their way up through the building. It is also considered better for light, the prevention of noises, etc.; in fact a great many other reasons might be given to show the advantages of this location.

Two batteries of boilers have been provided; one battery located in the east boiler house, consists of four large Heine boilers with a capacity of 700 horse-power. These boilers are provided and fitted up with what is known as the Hawley Down Draft. This battery, practically speaking, is the battery that will supply all power for heating and ventilating the building, running all appliances in connection with same and furnishing power for generating electric current for all purposes. The other battery of boilers which is called a "supplementary battery" has been placed in the west house, and consists of four large tubular boilers. These are fitted with the "Jones' Mechanical Under Feed Stokers." There are also contained in these boiler and machine rooms, the pumps, exhaust tanks, feed water heater, oil separators, blow off tanks, steam distributing tank, hot water heater, electric light switch boards, and the apparatus in connection with

Paul and Johnson systems, which will be more particularly referred to at a later stage in this description, also many other appliances which space forbids mention of. Accommodation is also provided for the electric dynamos to generate current for the purpose of lighting the building, running the elevators, etc.; in fact an inspection of the plans and the work as far as it has gone in connection with these apartments shows them to be most complete even to the hydraulic appliance for lifting ashes up to the level of the court yard above and a dumping trolley that is provided to convey the coal from coal-house and deposit same in front of the boilers.

Extending off the boiler-houses is the coal-house, also under ground, so conveniently arranged that the coal can be carted into the yard and dumped directly into the storing bins. The "supplementary battery" of boilers in the west side has been provided in case the city and county should see fit to separate in the matter of running expenses of the building; in such case the city and county would each have their own heating appliances, to be managed and run according to their own wish and direction, and in case of accident to one battery the other may be used by operating the valves provided for that purpose. It will thus be seen that by no possible chance or accident will the building be left without necessary power for heating or supply of steam for all appliances.

The heating and ventilating plant is so far completed that the architect is now utilizing the same for heating the building, and although not completed, it gives every assurance of being a very perfect working plant when finished.

The system of heating as adopted is what is known as the One Pipe Overhead Low Pressure System, the steam being conducted through large mains 15 ins. diameter running right and left from the boiler house and extending up to the top of the building and there connecting to the horizontal circulating mains which supply the drop feed mains to the Safford Patent Radiators which are fitted up exclusively throughout these buildings. These drop feed mains are continued to the sub-basement where they are connected to the return mains which convey the condensation back to the receiving tank, where it is automatically supplemented with the required quantity of hot water and pumped back into boilers, the pumps being regulated by a self-acting governor. The steam used for heating the building consists of the exhaust steam from the engines and pumps, etc., which, after being passed through a receiving tank which is known as The Excelsior Combined Feed Water Heater, Purifier, Tilter, Oil Separator, Expansion and Receiving Tank, to exhaust all oil and grease, etc., from same, is passed into the heating mains and automatically supplemented through a pressure reducing valve with live steam as required.

The objection to this method formerly was that the pressure required in the heating mains to force the steam through all the radiators was sufficient to cause considerable back pressure on the engines and pumps, thereby reducing their efficiency and consequently wasting fuel. This drawback has been entirely overcome by the architect, who has adopted the "Paul Vacuum Exhaust System," which system exhausts the air from all the radiators and mains and maintains a vacuum, thereby enabling them to be filled with steam without any back pressure whatever. The great advantage and saving by this method is evident. This system has gone beyond the experimental stage, and is being installed in most of the important buildings recently constructed. In every case it is said to have proved a great economizer and was adopted by the architect only after numerous and careful investigations of its value.

Another important addition to this plant is what is known as the "Johnson System of Automatic Heat Control." This system regulates the heating of the apartments and maintains any desired temperature that may be required. Thermostats are placed in the most suitable positions in the rooms or halls; these thermostats are connected with the automatic steam valves attached to the radiators, and are so sensitive that they will open or close the valves at a variation of one degree, so that the temperature of an apartment equipped with these contrivances will not vary more than one degree in a day.

The saving in the adoption of this system must be apparent, inasmuch as the steam is only on the radiators when heat is required, and is automatically shut off when the apartment is warm enough; and further, it does away with the trouble, annoyance and expense of regulating the valves by hand. This in itself must be of great value from the standpoint of economy, as well as in avoiding the necessity of opening and closing of windows on account of an apartment being overheated, with consequent draughts. This is not an experiment with the architect, but is one that has been adopted by him in other large buildings in the city of Toronto within the last few years, and which in every case has given satisfaction.

VENTILATION.

Ventilation, as a branch of sanitary science, has within the last five or six years received much attention, with the result that more progress has been made in providing healthful conditions than in any 25 preceding years. The amount of ventilation obtained by the old style direct and indirect heating system is not constant, but is subject to outside conditions, such as direction and velocity of external air currents, etc., and it is impossible to plan or construct such a system to supply a volume of ventilation based on known requirements that would be constant and controllable.

The system adopted in this building is what is known as the Plenum method of mechanical ventilation. The fresh air is brought down in the tower and after being passed through cleansing screens and all impurities removed, is blown by large fans through the heated surfaces in the fan chamber and distributed throughout the building. The warming of this air is also regulated by the Johnson System of Heat Control, the air being automatically subjected to just sufficient of the heated surface to maintain the desired temperature—the air being forced in, and its quality, quantity and temperature are completely under control; all spaces are filled with air under a slight pressure, the leakage being outward, prevent the drawing of polluted air into the rooms from any source. The removal of the foul air is amply provided for by the construction of special flues in connection with the system, arranged so as to produce the best results. This ventilating apparatus will completely change the air in all offices, council chamber, court rooms, judges' rooms and other apartments, every ten minutes. Any one who has sat in the present City Council chamber or in any of the present court rooms for any length of time will readily understand the great advantage of such a system.

THE ELECTRIC LIGHT WIRING.

The electric wiring is another important addition to this part of the work. After careful investigation by the architect to ascertain the best and safest method to install, he decided to adopt the iron armored conduit system throughout the building. This system possesses so many important features that it is worthy of special mention. It consists of highly insulated water-proof steel tubing connecting to all outlets, junction boxes, etc., through which the electric wires are run. These tubes are all concealed, nothing being shown but the outlets and junction boxes. At any one of these outlets a fishing wire can be inserted into the conduits and readily pushed through to the next outlet. The electrical conductor can then be attached and drawn through at any time. This can be repeated from outlet to outlet until the end of each circuit is reached, the conduit all being completed and the wires drawn in afterwards. These wires are always accessible thereafter for renewal or examination, rendering it unnecessary to destroy walls or ceilings or disturb flooring, or, as is generally the case with the ordinary plan of wiring, to abandon entirely the concealed conductor that has become deranged and resort to surface wiring; there is also no danger of nails being driven through the insulation, as is often the case, with serious results, where this system is not used.

This system, although comparatively new in this country, has been and it being adopted in all large and important buildings in the United States, it being regarded as being absolutely safe against fire under all conditions.

THE PLUMBING.

The great developments and improvements in the science of plumbing within the last few years are fully demonstrated in the work on this job, which is the most complete and perfect from a sanitary point of view that can very well be imagined. All the most modern ideas for securing perfect ventilation and a complete sanitary job have been employed. The plumbing fixtures of the different best known makers were put to a thorough and careful sanitary test by the architect, both as to strength of materials and perfect working qualities, before being adopted; only those of the highest class being selected. The piping and fittings used are all of extra heavy weight and are arranged so as to be accessible in case repairs are needed.

The plumbing fixtures are all left open, and all partitions, linings, etc., are constructed of marble supported on metal legs, the use of woodwork in the lavatories or any other materials that would absorb moisture being entirely done away with.

The Bennett & Wright Company, Limited, of this city, are the contractors for the heating, ventilating plumbing, gas-fitting and electric light wiring.

Not until we review this work in all its many trades and details can we understand the magnitude of the undertaking, and the immense amount of architectural skill and labor necessary to carry it to completion.

At the Caledonia iron works in Montreal recently, was given a practical demonstration of a new process of jointing pipes. The process of making and fixing the ring joint is an entirely new departure from the customary methods employed in jointing pipes, and overcomes the difficulties incidental to pouring and caulking lead into pipe joints in wet trenches. The ring joint is made with cold sheet lead, which is circumferentially contracted and indented by the pressure of a contractible tapering wedge and an external compression ring. The experiments were witnessed by a number of pipe manufacturers, contractors and other interested persons, and created a most favorable impression. The invention is protected in twenty-four countries, Messrs. James W. Pyke & Company being sole agents for Canada.

TEST OF BLOWING FANS.*

Two years ago, in connection with the subject of ventilation, we commenced, at Cornell University, a study of different fans in order to find not only the efficiency of the various fans made but also to find what shapes gave the best results and what were the conditions necessary to be fulfilled in order to produce the best results. When we undertook this investigation, I thought it would be a very easy matter to carry it out. We have been at it now for three years, and I think we have tested some seven or eight fans. We have tested an experimental fan which we built in various ways and shapes, and we still find that there is very much more to be done before we can make a complete report. I think the question is of a great deal of importance to us all, and I believe there is no machine built anywhere in the world that is of as much importance as the blowing fan that has been so little investigated, and regarding which there is so little known. It is of special importance, since, if we are in the dim future or in the near future to ventilate our buildings, we must do it by some sort of fans, and hence it becomes necessary to get exact knowledge regarding them. I think if you have erected fans and have taken data from the catalogues published by the various makers, that you have found the results actually obtained practically were quite different from those stated in the catalogue; at least, that has become so trite a saying that I suppose the statement will pass unchallenged. In fact, I think you will find—and this I do not know to be certain in regard to all fan catalogues, because I did not investigate all of them—that the figures in the fan catalogues which show the capacity of the fans, and how much air can be moved, require a fan of 100 per cent. efficiency—a perfect fan. I might say that not only never has such a fan been built, but it is impossible to build one, from theoretical reasons, too, as well as practical ones. Hence it is absolutely impossible to attain the results which are given in certain fan catalogues, and possibly in all of them. But, on the other hand, I do not want you to think that the fan people do not know that. Consequently, when they sell you a fan they usually give you private information, which is much more accurate than that which is published.

TWO TYPES OF FANS.

If you have looked into the subject of fans you will have noticed, of course, that there are two very distinct types sold. These are sold, I believe, for distinct purposes, and rarely come into competition. One we will call the disc fan, in which the air is received at one side and carried right through the fan and discharged in parallel directions with the axis. The other is more commonly called the blower or centrifugal fan, in which the air is discharged from the edges of the blades and then carried off by pipes or some other arrangement. The disc fans are, I think, never put in for pressure fans—that is, they are not used in places where air under pressure is required. They are generally used in places where air needs to be moved from a room and discharged into the open air—exhausting purposes principally—and this work they do very nicely. The other class of fans is used both for exhausting air and for discharging air into pipes—that is, for moving air under pressure.

The air in the centrifugal fan is received at the centre of the blades, and by their motion it is thrown to the outside of the fan and discharged outward. This was ascertained some years ago regarding suction fans, I think by Gibbeau, a Frenchman—namely, that if he attached a chimney to his exhaust fan he increased the efficiency very much, almost doubling it; that is, if you take an exhaust fan and discharge the air, it would require a certain amount of work to move a certain amount of air. If, on the other hand, you construct from that fan a tapering chimney, you will discharge with the same amount of work very nearly double the amount of air. This principle, as it was stated by Gibbeau, has been verified and is known to be true. It applies only to suction fans. It shows that the chimney is a very useful adjunct indeed to such a fan.

In this country I believe the chimney has not been used, except, it may be, in fans constructed for ventilating purposes; and, by the way, you should all know that the mining engineers are the men who have had the most experience with fans. They have had to use fans to ventilate mines, and it was from their practice that this fact was learned.

PRESSURE FANS.

In regard to pressure fans—that is, the fans which deliver the air from the tips of the blades—it was found that the efficiency was very much increased if the casing was made considerably larger than the fan. If you run a fan with a casing very close to the blades, you will find that it requires very much more work to move a certain amount of air than if that casing be some considerable distance from the fan, and this has been found to be true in regard to centrifugal pumps for pumping water. The reason for this is that the air is thrown out entirely by centrifugal force. The particles of air strike the blade and are projected. If there be not room at the end of the blades not only for the air to be stored, but to get rid of its whirling motion, there will be a considerable loss of efficiency, and it has been found that in order to give the best result the area at the end of the casing should be about equal in length to the length of the blade of the fan.

In regard to our experiments, I will say that we started out two years ago, first by testing one of the commercial fans, afterwards by constructing an experimental fan, and then putting the greater portion of our work on the experimental fan. The experimental fan was in some respects very much like the commercial fan, but we built it in such a manner that we could vary the shape and size of the blades, and also the form and size of the casings, these being the important things. Then we made various experiments under different conditions, in order to ascertain under what conditions we obtained the best efficiencies, and then we verified some of the things we found out later. I will not trouble you with all the details, but I may mention that we found that a fan with straight radial blades would perhaps move the most air for a given diameter. That is, a 48" fan, with the blades slightly bent at the inner sides, would move the most air; but we found that when we curved the tips of the blades backward, with the inner edges running a little forward, we got the highest efficiency. That is, for the same amount of power applied we got the most air moved, although for the same diameter the other style of fan would move the most air.

We also found, in regard to the casing, what I have practically announced as a general principle—the casing, at the end of the fan, in order to give the best results, must be away fully the length of the blade, otherwise it will affect the result seriously. One other thing we found is this—which differs from what has generally been announced regarding fans, at least in the different makers' catalogues, and I feel very certain that it is true, because it was not only true in respect to our experimental fan, but it has been found to be true of commercial fans that we tested—that the efficiency increased with the speed of the fan up to a certain size and up to a speed which gave us a pressure of about 2½ inches of water measured by the manometer. There was a falling off in efficiency below that. That speed corresponds in all fans to a speed of about 6200 feet per minute of the tip of the fan, and if we ran any of the fans slower or much faster than that there was a falling off in efficiency.

If you will look in fan makers' catalogues, I think you will find that you can move a great deal more air with a great deal less power if you run the fans at a much lower speed than I have given. Their statement does not seem to me correct. We found that by increasing the speed of the fan we moved more air with less power up to that point, and we found, further, that it was more economical to keep a considerable pressure and let the fan work against a pressure corresponding to something over an ounce, or, say 2¼" of water, than to work freely against the air.

I speak of these points because they are points which have not been considered good practice; and, too, in the putting in of a forced-blast system it has been thought best to keep the velocity and pressure down very low. Consequently, this shows that in this respect our practice has not been leading to the very best efficiency.

MEASURING VELOCITIES.

In connection with efficiencies, I should like to say a word or two about measuring the velocities of air. If you take up this system of ventilation, as perhaps you all may very soon, you must know how to measure air, and I tell you it is the most difficult thing to measure that you ever had anything to do with. You may get a great deal of practice in measuring it, and, from the very fact that we cannot see it, you will find that it is very hard stuff to handle. It does not move with uniform velocity in the pipe, and that has made more trouble for us than anything else.

I have been looking over some old fan tests where the efficiency ran over 120 per cent.—that is, where the actual work of moving the air was 20 per cent. higher than that done by the engine driving the fan. This test was made in a report by Professor Trowbridge. Now, what does this mean? It means that he made a mistake in measuring the air. If you will use some instrument you will find that the air is moving five or six times faster in some places in the pipe than it is in other places in the pipe, and if you stick in your measuring tube in that spot where it is moving faster, and figure on that, you will have a remarkably good efficiency. On the other hand, if you will take care and put your anemometer successively in all portions of the pipe, the result will not come out anywhere near that.

There was another thing which troubled us—viz., the anemometers. We have three of them, one a brand new one which came to us fully certified that it was perfectly correct, but I found on comparing it with the one we called standard last year that there was about 40 per cent. difference, and between it and that we called standard the year before, 20 per cent. So there was trouble right away. Then we set out to standardize the instruments ourselves, and, I might say, the result showed that they were all wrong. The method we used to standardize the instruments was to swing them around through the air on a long pole. Knowing the circumference of the circle, and the number of revolutions made, you have the distance it travels, and, if it moves through perfectly still air, the supposition is that the air would produce the same result in every case. This is the method usually adopted, to which, of course, there are some theoretical objections. Moving the anemometer through the air is not really the same as having the air moved through the anemometer.

Another method which was used for calculating the anemometer, and which was finally adopted as giving the best results, was to check its readings by blowing the air through a large tube, in which a steam pipe was so arranged that all the heat given off by the steam pipe must be taken up by the air; in which case, if the number of heat units calculated as having been absorbed by the air (temperature, volume and velocity being the three factors of the calculation) was the same as the amount determined as having been emitted by the condensed steam, the reading of the anemometer was taken as being correct.

EFFICIENCY OF FANS.

I might say that the highest possible efficiency of a fan delivering air without a casing is not over 50 per cent.—that is, theoretically—because there are theoretical losses which are equal to 50 per cent. of the work put in. Consequently, we know that we cannot get very high results. By putting on a casing and putting on a chimney, it may possibly be brought up to 75 or 80 per cent., although it is very doubtful, I think, if anything has passed 80 per cent.

With the pressure blowers, we got quite uniformly the same results with all the different types. That is, with three different fans, and at the speed of which I spoke, we got an efficiency that ran from 32 to 47 per cent., varying with the conditions, 47 per cent. being the very best. In order to get that we had to construct our experimental fan with square blades, almost exactly like the commercial fan of that diameter, and we gave it a single inlet (22 inches in diameter), taking in all the air from one side and delivering it at the other side. With that condition, the best efficiency we could get, even at the best speed, was about 35 per cent.

Afterwards we made a double inlet—that is, put an inlet on the opposite side of the fan—and simply the changing of the inlet increased the efficiency of the fan from 35 to 47 per cent., which shows that the rectangular fan supplied by air at the center on a single side cannot get a sufficient supply to keep the casing and all the parts full; and it would also point as a probable improvement on fans, that if we were to make the fan slightly conical—that is, make it larger near the centre than at the outside, by means of which we could admit more air through a given sized hole; that is, if our entrance in proportion to our discharge orifice was made larger—it would no doubt increase the efficiency. This was ascertained some years ago, but I think it has been overlooked by our manufacturers generally, because I know of no American fans built with the conical case, although some foreign fans have been built that way.

I think that from 35 to 47 per cent. is just about the commercial efficiency of fans run under the best conditions. In proof of this proposition I might say that I have looked over a large number of tests, and I believe in hardly any case did I find that the efficiency had been higher. It has gone as high as 47 per cent. only in such cases where the inlet was double or the passage for the entrance of air was made very large indeed. Practically this would mean that if the catalogue tables are based on the 100 per cent. efficiency, we must multiply the air by just about 3, in order to find the power necessary to drive a given fan as printed in a given catalogue.

We went further than this and tested a few fans that were running in buildings and which were used in connection with hot blast, or the hot and cold blast system of heating and ventilating. In all these cases we found the fan efficiencies very much lower than those which I have given you, or, in other words, we found that the fans were not working under the best conditions. We found in every case that the fans were running very much too slow, and the efficiency, instead of running up around 25 per cent. ran under 20 per cent, and yet the fans were perfectly capable of returning a very great deal more for the power put into them.

SPEED.

It seems to me from our investigations that there can be no very great objection to increased speed, except in such cases where noise is objectionable; of course you understand that the noise will always increase with the speed. I think we should all endeavor to ascertain at what speed a fan gives the very best results.

In addition, I might say that we found the following propositions to be true:

(1) That the amount of air moved by a given fan would vary directly with its speed—that is, if you turn it over twice as fast, it will throw out twice as much air.

(2) We found that the work required to move the fan varied with the cube of the speed.

(3) We also found, as an interesting fact, that if we took and formed an equation, of which the peripheral speed in feet per second—that is, the speed of the tips of the fans—was put on one side, that number was equal, in practically all of our experiments, to forty-seven times the square root of the highest pressure, expressed in inches of water—that is, about three-quarters of the peripheral. In other words, we found that the highest pressure we could produce was about three-quarters of the theoretical, and the highest pressure can always be produced when there is no air being discharged from the fan. When there is no air being discharged from the fan there will always be a less pressure than the highest, because two things together constitute the total work of the fan.

Then there was one other useful point, which, from the fact of its being of some interest, we noticed—viz., the relation of the velocity of the tips of the fan to the velocity of the air that was driven off. I want to tell you that there is no relation between them. The whole matter rests upon this fact: If you allow a pressure to accumulate in front of your fan, as you may do by holding the air back and then let that air discharge freely afterwards, it will go downhill at any rate whatever, and may travel three or four times as fast as the tips of the fan.

DISC FANS.

In regard to disc fans the efficiency runs lower. We did not get as high an efficiency in a single case with a disc fan. I think they must necessarily run lower. More than that, just as soon as we got them working against any pressure, the efficiency almost entirely fell off—that is, we were turning the fan round and moving very little air. Yet the disc fan is very much better suited for certain classes of work. In making this statement, of course, it is not to be understood as at all derogatory to the disc fan. They are two classes by themselves, one used for one purpose and the other for another purpose.

Practically, then, the way our investigation stands at the present time is that about the best efficiency we can get out of the blower fan is about 35 per cent. with the single inlet, or, through a double inlet, about 10 per cent. better. That may seem to you to be more extravagant than ventilation by means of chimneys. I think we discussed that at our meeting last winter, and the table I gave you then was figured out on a supposed fan efficiency of 25 per cent., and perhaps you may remember that the fan then came out, even when I used a very wasteful engine, 50 times as economical as a chimney 1,000 feet high. If, instead of the fan being 25 per cent., it is 33 per cent., of course our fan then becomes 75 times, instead of 50 times, cheaper than a chimney.

In other words, we cannot afford, even though our fan is inefficient, to ventilate by heat. We must afford to ventilate by power. Mechanical ventilation is the ventilation which is coming and which we must learn to handle; and it is coming because it is more efficient, because it is cheaper, because it is more positive, because it is more certain and sure to give the very best results.

*Address by Professor R. C. Carpenter at the Convention of the American Society of Heating and Ventilating Engineers.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

ORGANIZATION OF A BUILDERS' EXCHANGE.

It is gratifying to learn that the necessity for organization on the part of the building industry of this city has at last been recognized. At a meeting recently held in the club room of the Windsor Hotel to consider the subject, Mr. James Simpson, of Simpson & Peel, was voted to the chair, and Mr. G. J. Shepherd appointed secretary pro tem. The secretary stated the object of the meeting to be to consider the advisability of organizing a Builders' Exchange for the city of Montreal, on the lines of similar organizations in the principal cities of the United States. Such an organization should afford opportunity for an interchange of views on matters affecting the building trades, and through the medium of a representative Board of Directors, having power to arbitrate, would be of great assistance in the adjustment of differences between employers and workmen. Further than this the idea of the promoters of the Exchange was that the headquarters should be in a central location where members desirous of doing business with one another or with outsiders could meet at certain hours of the day for that purpose. In addition to these objects the organization of a Builders' Exchange would place the building industry on a footing consistent with the growth of the city.

After an expression of opinion had been obtained from several of those present at the meeting, it was unanimously resolved on motion of Mr. Peter Lyall, that the meeting be organized into a Builders' Exchange. On motion by Mr. Stephenson, a provisional board, consisting of Messrs. Simpson, Lyall, Fournier, McLean, Cowan and G. J. Shepherd, was appointed to obtain information regarding a charter and suitable rooms, and to report at a meeting to be called for that purpose, as well as for the purpose of appointing a permanent board of directors. If the charter of the former Builders' and Contractors' Association shall be found to be yet in existence, there will not be the necessity of applying for a new one.

The following firms have expressed their intention of co-operating in the movement for the establishment of a Builders' Exchange, and thus the bulk of the funds required for expenses are at the outset guaranteed: Messrs. E. Fournier, Peter Lyall, W. A. Stephenson & Co., Peter C. Wand, Castle & Son, Jno. Murphy, Wm. McNally & Co., The Montreal Roofing Co., T. A. Morrison & Co., Geo. R. Locker, Oliver Deguise, Alexander Bremner, Geo. W. Reed & Co., Wm. Rutherford & Sons, Miller Bros & Toms, Jas. Walker & Co., H. R. Ives & Co., Jno. A. Boomer & Co., Dominion Bridge Co., E. F. Dartnell, A. E. Wand, Wm. Swan, G. A. Grier, John McLean, Montreal Lime Co., Geo. J. Sheppard, A. P. McLaurin, Jno. Morrison, Jr., & Son, Simpson & Peel, Heggie & Stewart, A. Cowen, W. W. Scott & Co., Laird, Paton & Son, J. W. Hughes, J. E. Bulmer, J. H. Huchison, James Cochrane, Thomas Forde, W. P. Scott, Wm. Briggs, Wighton & Morrison, Beckham & Scott, Isaac Lewis, McLaurin Bros., The Jas. Shearer Co., McArthur & Co., J. N. Hickey, Knott & Gardiner, Charles Sheppard, Wm. McArthur & Sons, John Watson and the Laprairie Brick Co.

ARCHITECTURAL COMPETITIONS.

The following circular was recently sent, by direction of the Council, to each member of the Province of Quebec Association of Architects:

DEAR SIR,—Several complaints of grave abuses existing in the practice of our respected profession having recently been brought before the Council, it has resolved, so far as it is in its power, to continue to protect the interests, and especially to use every endeavor to maintain the integrity and honor of the profession.

It has come to the knowledge of the Council that there are members of the Association who do not scruple to take part in competition with self constituted architects on the most humiliating conditions for honorable men; agreeing to make designs and obtain tenders for work without any assurance of an expert report and without any promise of remuneration.

The Council would earnestly remind the members that the cure is in their own hands, for as long as the public can get reputable members of the profession to join in competitions on such an unsatisfactory and unworthy basis, so long will they continue to make such conditions.

Such self-depreciation on the part of the members of the Association can only have one result, viz., that of lowering the status of the profession generally, and bringing it into contempt in the eyes of the business men of the community.

The Council trusts that each member will refrain from having anything to do with such competitions, and do all in his power to have competitions arranged on a fair and equitable basis and such as will be honorable alike to the public and the profession.

By order,

(Signed) JOS. VENNE, Secretary.

AN IMPORTANT DECISION.

Following is the decision in full of the Recorder in the action brought by the Building Inspector of Montreal against Contractor Paquette for alleged violation of the City Building By-law, brief reference to which was made in the CANADIAN ARCHITECT AND BUILDER for November:

"The defendant is prosecuted for having, on the 21st of August, neglected to conform to a notice of the Building Inspector, Montreal, ordering him to demolish some division walls in a building on Cherrier street, the property of the Tourville Estate, said walls not being of brick or stone, as required by sections 12 and 14 of By-Law 107, but of terra cotta.

"Section 12 of By-Law 107 says that 'in the case of a row of tenements, stores or warehouses, each tenement, store or warehouse shall be divided by a wall of brick or stone.' Now section 14 says: 'Brick are supposed to measure 8 inches in length by 4 inches in width and 2½ inches in thickness.'

"Sections 11 and 13 of said by-law say, 'brick or stone or other incombustible material,' and the city does not complain of the substance, which is incombustible, but contends that it is not strong enough to support the load placed upon it. Furthermore, this terra cotta is commonly called brick, and is incombustible, so it answers the requirements of the by-law as far as that goes. The whole question now rests in the fact of its strength and resistance. Many witnesses have been heard on both sides. I will only consider those who have based their evidence upon scientific and practical experiments. Tests of this terra cotta were made at McGill College in 1894 and 1897. The last test took place September 9th, 1897, on two different pieces—one crushed at 46,000 lbs., equal to 479 lbs. to the sq. inch; the other crushed at 67,000 lbs., equal to 677 lbs. per sq. inch. Architect Taylor has figured the weight the walls had to carry, but did not believe they were strong enough.

"Jos. Beland, contractor, said he had not seen the walls, but was of opinion they were not strong enough, and was prepared to condemn them.

"M. Huberdeau said he had seen terra cotta used for walls and other purposes in many buildings. When asked by the building inspector if he did not know of a case where terra cotta had crushed under a beam, he said in one case in a building for the Masson Estate the end of a steel beam resting on the lining instead of on the wall, the block being on edge, had failed, but this was no fault of the terra cotta, as a beam resting in the same condition upon the solid brick would have brought similar results; the fault was in the construction and not in the material.

"M. Brunet produced tests of pressed brick, showing it was much stronger than terra cotta, etc.

"Mr. Lacroix, the City Building Inspector, admitted that there were many buildings in Montreal in which terra cotta was used, such as the Canada Life and others, but that they carried no load, being protected by steel construction, etc. Mr. Lacroix says that judging from McGill College tests the brick is not strong enough, having crushed under a load of 46,000 lbs. upon a surface of 96 square inches, giving a factor of safety of only 239 lbs. Multiplying this factor by 12 inches, the square of the brick, gives 2868 lbs. as the weight it can safely carry. According to this estimate this brick will not carry the weight placed upon it. The floors are supposed to weigh 160 lbs. per square inch as a factor of safety. The house being 25 feet wide, the joists are 24 feet long, each wall carrying one-half. The joists being 3 feet apart

gives a surface of 36 square feet to be carried by the wall, multiplied by 160 lbs. gives 5,760 lbs. to be carried by a strength of only 2868 lbs.

Mr. James Nelson, architect, has visited the building and examined the walls and reports as follows:

Area of floor carried by joists—	22 ft. x 16 ft. =	352	sq. ft.
	13½ ft. x 21 ft. =	283½	" "
Area of roof carried by wall	15 ft. x 37 ft. =	555	" "
Total area of floor and roof carried by wall		1190½	" "

Allowing 150 lbs. per square foot for the above case, the total load carried by the wall would be 1190½ x 150 = 178,575 lbs. Area of cross section of wall carrying this load is 37 ft. x 8 ins. = 3552 sq. ins.

The above load of 178,575 lbs. distributed over the above area of 3552 sq. ins., gives a pressure of 50¼ lbs. per sq. inch. The area of a terra cotta brick laid on the flat is 96 sq. inches. The load on one brick is therefore 50¼ lbs. x 96 sq. inches = 4,324 lbs. per brick.

According to Prof. Bovey's test the weakest specimen crushed under a load of 46,000 lbs., being 479 lbs. per sq. inch, whilst the load on the wall as above shown would only amount to 50¼ lbs. per sq. inch, thus giving a factor of safety of 9½. A factor of safety of 8, which amply provides for weight of the wall itself, is sufficient according to Trautwine and other authorities. Kidder, a standard authority, in his latest edition (1895) gives as the loading for ordinary dwellings, including the weight of floor beams and plaster, 62 lbs. per sq. foot. If we adopt this view, then the factor of safety for the terra cotta walls in this case would be raised from 9½ to 24.

Mr. Hector Lapierre, architect, has visited the walls in question, and finds them sufficiently strong to carry the weight placed upon them and his figures agree with those of Mr. James Nelson. He says further that they have built such walls at different times and they have proved satisfactory, etc.

"Mr. A Fowler, architect, says he has used terra cotta walls for the last 8 years and that they carry floors and are solid.

"Mr. Chas. Chausse, the architect of the houses in question, says he has used this terra cotta for division walls for the last 8 or 9 years in many buildings and in cases where the load upon them was much heavier than ~~in this~~ case, and the walls in the present case are perfectly safe. He says he knows by experience just what they will stand.

Messrs. James Wright and Maurice Perrault, who acted jointly with Mr. Nelson as experts, corroborated Mr. Nelson's report. Mr. Bulman has also used it for division walls and found it good; he also produced a sample of a very poor quality of brick which is being used in a building in this city.

"M. Joseph Brouillette, a contractor, says while he was putting up some buildings last summer in which the division walls were of terra cotta, a large quantity of brick and mortar fell upon one of the floors, crashing through the joists, and the terra cotta wall remained intact.

"Other witnesses appeared, and all declared the walls safe.

"Mr. Gagnon, the secretary of the Montreal Terra Cotta Co., said that the difference in the crushing strength of the material is due to the fact that more or less sawdust is put into the mixture as required for different purposes, and that in the last few years there have been great improvements in the manufacturing of the material owing to better facilities and improved machinery and appliances.

"Apart from all the foregoing evidence I have before me letters from architects and others recommending the use of the material; also a long list of buildings in which it has been used. All these buildings were erected with the knowledge of the Building Inspector, who on the 12th of March, 1896, gave the company a letter of recommendation.

"In the face of all the foregoing evidence I could not condemn the defendant in this case, and the action is dismissed."

TO ARCHITECTURAL STUDENTS IN TORONTO.

IT is proposed to organize for architectural students in Toronto a class in wood carving. It is thought that such a class would be very helpful to students.

The class would not be an expensive affair, as there would be no tools to buy and the lessons would be very low if a class of eight or ten were formed.

It is hoped that such a class can be commenced about the early part of January, 1898.

If any of the architectural students of the city would care to join such a class, their communications to D. N. S. Nichols, care Burke & Horwood, would facilitate matters.

COMMON SENSE IN HOUSE PLANNING.

IT seems to me that a few remarks and suggestions in the way of general house planning might prove interesting, particularly to those interested in house plans, writes J. P. Hicks in the National Builder. First, I wish to call attention to the front halls, which in many cottages, as planned at the present time, are entirely too small. It seems that some plans appear crowded. For example, some of the space that should be in the hall is taken for a front bed-room. Closets are very convenient and useful, and, in short, seem to be almost indispensable, yet it is a great mistake to cut a front hall down in size to about 3 × 5 feet. Such halls are a nuisance, as there is barely room to stand inside and open the front door. The side door, of course, opens at right angles to the front door, which makes it extremely difficult to pass in and out with furniture. This kind of hall may suit some people, and may seem to meet all the requirements of a hall, as they pass in and out empty-handed camparatively easily. It is in moving furniture that the great disadvantage of small halls becomes apparent. If there is a piano, organ, book-case, extension table, or any large piece of furniture, the chances are that it will not go through the doors, and if it will barely go through it generally comes out with scratches and bruises, as well as the casings in the hallway looking the worse for wear and tear.

I know that many will argue that large halls are expensive, and that they can better afford to put up with the inconvenience in moving than to pay the difference in the cost of construction. Then again it may be that they don't just see how to enlarge the hall in the plan they are building after. It can usually be accomplished easily and with but little additional expense, in the following manner: Build the hall out on the front porch octagon shape, and large enough to give the desired amount of room, and, if desired, extend the porch in the same manner; it will add to the outside appearance of the house, and inside will give a large and commodious hall. The front room might have an octagon corner next to the hall, and the entrance from hall through this corner will make the house easy of access and the moving of furniture in and out will be an easy matter, besides almost everybody will remark what a nice large hall you have.

There are various ways to enlarge upon the hall room after the manner just described. Every plan might not require just the same style and shape in the enlargement, but where the hall is small and more room is wanted, I would suggest a little study in the way of enlarging, as there is a variety of ways to add to the beauty and convenience of a residence in this respect.

The kitchen is another part of the house that should be roomy, but on the contrary we find many of them exceedingly small, with only room enough for a cook stove, a table and a chair or two. These kitchens in size are usually 8 × 10 feet, which must necessarily be a source of great annoyance to the housewife. There is nothing like plenty of room, especially where the most of the time has to be spent in doing the ordinary household work. Everybody knows how hard and inconvenient it is to work in a cramped up place and everybody growls at it. Give the women plenty of room in in the kitchen, also in the pantry; they will appreciate it, and in nine cases out of ten it will make them better natured, and the husband can congratulate himself on the fact that he has given his better hall plenty of space in the great workroom of the house, the kitchen.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

High or Low Ceilings?

IT is not many years since it was given out as a canon of health by architects, doctors, and sanitary engineers, that high ceilings were absolutely necessary. The arguments in support of a generous space were numerous, some of them referring to the exterior effect of the structure, but mostly referring to the healthfulness of the room itself. Recently, however, it seems that scientific arguments are being offered in favor of low ceilings. Low walls to rooms, it is said, are being advocated in England as really affording better ventilation throughout, in preventing the formation of upper strata of all but immovable foul air, and tending to prevent draft. A room with a low ceiling is more easily kept warm than one with a high ceiling, and in this country this is quite a consideration. There is an artistic value in the low ceiling that is not found in the higher one, besides a cosiness that is impossible with the more pretentious room. In the time of Good Queen Bess, the ceilings were low and the walls wainscotted. More comfortable houses were never built, and while the exterior may not have been as striking as the dwellings of later times, their interiors were artistic and better suited to the wants of the occupants than were the interiors of the houses erected 150 years later, when high ceilings became the fashion. For country dwellings ten feet should be the maximum height, and for cottages nine feet, and in some cases even less than that would be plenty high enough. As a matter of economy, low ceilings should be preferred, for every foot in the height of a building, be it wood, brick or stone, means quite an addition to the cost thereof.

Interior Finish.

THERE is no disguising the fact that the medium and hardwoods are rapidly crowding out the soft woods for inside finish. Pine, which is the most useful of woods, is scarcely used in finishing the better class of buildings to-day. Maple, birch, cherry, when available, ash, red oak and elm are the woods now in use, the latter being used for wainscot, mouldings, panellings and similar work. Speaking to a builder of experience the other day, who also owns a woodworking factory, he insisted that a house can be finished in plain red oak as cheaply as in pine when the latter is of good quality. This comparison is made of course when hand finish is contemplated. He added, that when the work is completed the superiority of the oak is so obvious that nothing more need be said in its favor. Red oak doors, if made solid, will twist out of shape, but if veneered on a pine or white cedar core, they will stand well, and if the oak be quartered, and properly finished, they become very handsome, and they may, if desired, be made to imitate antique oak with very little trouble or expense. It does not add much to the beauty of the wood, however, to make it darker. A natural color seems to give the best effect with red oak. With birch and cherry the case is somewhat different; these woods stain mahogany color readily, and for finish, look the better for it. Canadian cherry is of a kindly nature, is straight grained and works freely, and has the quality of staying where it is put, therefore makes good doors and sashes, worked from the solid, but better of course if cut into veneers and glued on to pine or cedar cores. In flooring the Canadian hard maple has no superior. It is better than the best of oak, as it is firmer in grain, less porous and less liable to splinter or wear to a fray grain; it will wear longer, and if kept dry will last as long. Next to maple for flooring comes birch; indeed, there is but little difference if conditions are the same. Birch will not last quite as long as maple, but is equally firm and will stand as much wear. Red beech is a very handsome wood, and when properly seasoned, makes a fine finish and requires no stain as the color is rich and mellow, and when properly polished, the surface gives off an effect similar to shot silk. For stair treads birch is preferred. It is not so slippery as maple and appears to be more yielding to the feet. For balusters, newels, hand-rails, and similar work birch does handsomely, but, of course, if other work in same room or hall is of oak, or other wood, rail and whole of balusters and newels should be formed of the same wood.

Strength of Walls.

A BALLOON frame with 2" × 4" studding set two feet apart, and boarded on both sides of the studding with one inch boarding, will sustain any weight it may be forced to bear, if the structure is used only for domestic purposes. For small churches, chapels, or even schools of small sizes, this sort of a wall may be found ample if the roof is properly constructed; but where buildings are intended to be used for manufacturing and storage purposes, a square timber frame, stone or brick should be employed in forming the outside and bearing walls. The strength of a wall is dependent on a number of conditions, the first being the materials employed; second, the way of combining them; third, the shape and dimensions of the wall. Walls of brick or dressed stones may be made thinner than if uncut materials were used. Practice has taught that when a wall of brick is to be nine inches, or one brick thick, the stone foundation carrying it must be over twelve inches thick; and a fourteen inch, or one and a half brick wall must have foundation of quarried-stone not less than eighteen inches thick resting on footings fully two feet wide. With ordinary walls, the height of which does not exceed twelve times their thickness, and that are not over one hundred feet in length without a partition, it will only be necessary to consider the resistance to pressure. To determine this a number of experiments have been made by practical engineers with the following results:

Kind of stone.	Pressure necessary to crush the stone.			
Granite	8,000 to	12,000	lbs. to	square inch.
Limestone	2,000 "	8,000	"	"
Marble	4,000 "	8,000	"	"
Sandstone	2,000 "	5,000	"	"
Good brick	1,200 "	1,500	"	"
Ordinary brick	600 "	650	"	"
Portland cement, neat	3,000 "	3,600	"	"
Portland cement 1, sand 3	1,200 "	1,600	"	"
Lime mortar	125 "	250	"	"

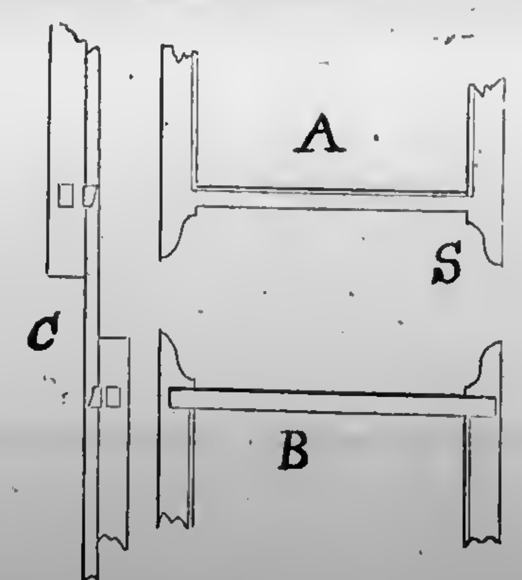
One tenth of the crushing weight should be the full extent of pressure allowed, for nearly all materials are more or less faulty, and this allowance of ten per cent. will be ample to meet all ordinary, and most extraordinary requirements. The ultimate strength of common bricks laid in lime mortar is about 1,500 pounds to the square inch, but if laid in Portland cement the power of resistance is increased to 2,500 pounds to the square inch; so to crush the lowest courses in a pier laid in lime mortar would require a height of brickwork of 2,000 feet, and if the bricks are laid in cement the pier will require to be 3,600 feet high to crush the lower courses. "Mahan's Civil Engineering" contains the following table, which shows the pressure on the lower courses of several noted buildings, and the percentage of the resisting power employed:

	Permanent strain in pounds per sq. inch	Crushing weight in pounds per sq. inch.	Factor of safety.
Pillars of the dome of St. Peters, Rome	230	3722	16
" " " St. Pauls, London	274	3733	13
" " " St. Genevieve, Paris	116	3167	8
" " " Toussaint, Angers	788	7880	10

The stone used in all the buildings named in the table is a limsetone of some kind or other.

An English Method.

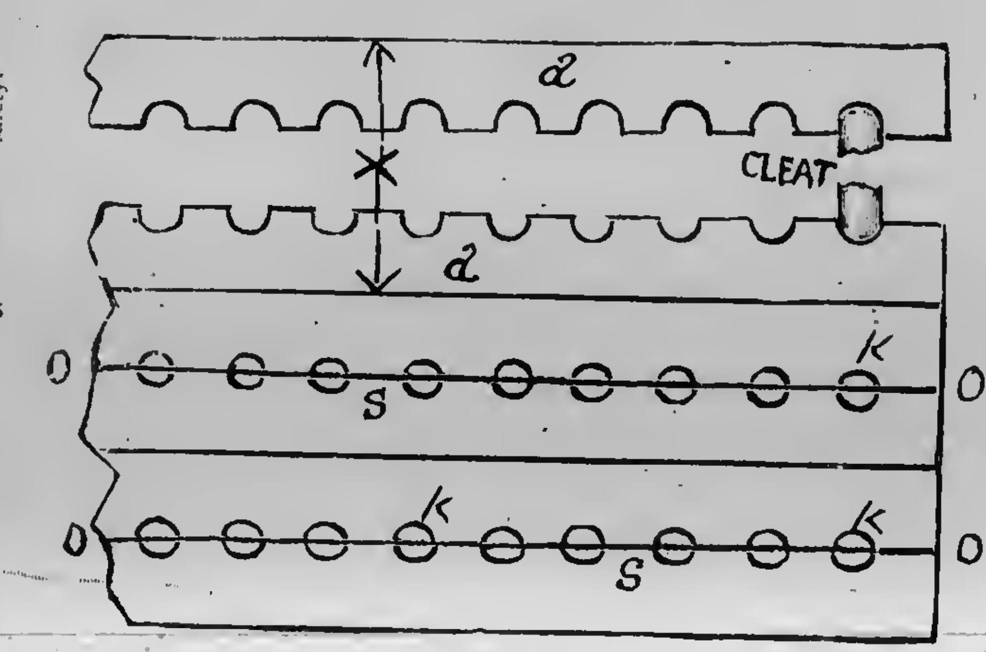
IN many parts of England there is a custom of making sashes with the stiles projecting beyond the meeting rail, and having their ends ornamented with an ogee end, as shown in sketch herewith presented. By this method a stronger sash is secured, as the tenon of the rail may pass through the stile its full width, or without relish, a very important feature. The bevel on the



meeting rail laps over the stile and adjusts itself to the parting head just the same as if the rail was dove-tailed into the stile. This style of sash is called in England "joggled sash," and the ogee moulding on the end of the stile adds considerably to the appearance of the work. The joggle (S) is left about two and a half inches past the meeting rail. A and B show the upper and lower sashes, and C shows the same in section. Joggled sashes should only be used where the top sheet or both sheets are hung; though the inside sash might be joggled, even if the sashes were held in place by stops, as is often the case in country houses.

Shop Wrinkles.

IT frequently happens that the country builder is called upon to erect "shop-fixtures," such as counters, shelving, drawers and the like work. In the making of shelving the old-fashioned way of "dadoing" or grooving the standards is in a measure obsolete, as when the shelves were once placed there could be no change made afterwards as to their position. The better way is to fit the standards with notched racks about one and a half inches wide, one being placed on each end of the standard on the sides receiving the shelves. These racks may be made with a dog-tooth notch on one edge to take in a cleat, or the notches may be semi-circular, the latter being by far the easiest made, and one much handier to adjust. The quickest way to make these is to prepare half-inch stuff three inches wide and the length required. Prepare as many as are wanted, remembering that one piece will make enough for one side of a standard. Clamp two, three or four of these strips together with hand-screws or other device, run a gauge line down the centre, as shown at SS in the accompanying diagram. On this line space off the regular distances, say two, three or four inches from centres.



With these points as centres, bore one-inch holes, as at K, K, K, K. Having gone the whole length of the strips, making clean holes with a centre bit, or, better still, with an expansion bit, saw the strips through on the lines O, O, O, O. Take off the hand-screws, and you have a number of pieces for racks similar to A, A. The cleats for carrying the shelves should be made of half-inch stuff, one inch wide, with the ends rounded to fit the half-circle in the racks, the shell, of course, fitting on this cleat when in place. The distance shown at X is the width of the standards. Shelves are made the same width, and are notched out on the ends to accommodate the two racks. This method is much less costly than the saw-tooth rack, and is just as good. This method will be found useful in fitting up pantries or store-rooms, where shelving often has to be changed to get proper distances between them. It is frequently used in cabinet work, for book-cases, cupboards and china-closets.

Our readers will notice the re-appearance in our advertisement pages of the announcement of Messrs. Merchant & Co., of Philadelphia. They call the attention of Canadian architects and builders to the merits of their metal "Spanish" tiles and "Gothic" shingles.

PROMINENT CANADIAN CONTRACTORS.

VII.

MR. CHARLES TILLEY.

THERE are few men in the Maritime provices engaged in the contracting line who are better known in the trade and by the public generally than Mr. Charles Tilley, of St. John.

Since early in the sixties Mr. Tilley has been engaged in contracting and building, and during that time has put up a large percentage of the buildings in his native city. He was born in 1839, and at the age of 15 years entered as apprentice the employ of Messrs. Crosby & Small, who were then the largest mason contractors in the city. After serving an apprenticeship of four years, he left Crosby & Small and went to Halifax, where he worked at the trade for a year.

He started in business for himself in 1863, his first contract being for the Hampton court-house. Since

MR. CHARLES TILLEY.

that time his business has steadily extended, and some of the best buildings in the city are from his hands.

After the fire of 1877 Mr. Tilley entered into partnership with Mr. John M. Redfern. This partnership continued for six years.

Among the many buildings erected by Mr. Tilley may be mentioned the market (cost $130,000), the Wygoody building, the Dock street electric light building (which has since been altered), and the Queen's Hotel, Fredericton.

PAVING BRICKS FOR BUILDING FRONTS.

THE pictures which we give of the building for the Home of the Friendless, in Chicago, are interesting not alone for their general artistic merit, says the Clay-worker, but as well on account of the means employed to accomplish an artistic result. As will be seen from the description, this building is faced with paving brick (seconds) from Galesburg, Illinois. The decorative parts are terra cotta. The natural color of the brick develops a rich brown and a variation in tint which is more and more sought for by the best architects. There was a time when it was supposed that for fronts each brick should be exactly the same color as every other brick. But in examining some of the brickwork of earlier centuries, where time and circumstances have made changes in color, it has been noticed by artists that the variation in color, when not too great, has been the means of producing highly artistic results. The architect of one of the most imposing houses in New York went to a terra cotta establishment some years ago and said: "I want to look over some of your cast-off clay products." In going through the yard he saw some blue mottled fire brick which were used for lining kilns. He bargained for them and they were used to face one of Gotham's finest houses, and mottled brick became a fad. This was about the first use that was made of this kind of brick for fine fronts in this country. While it has been carried to extremes in some instances on the whole the result has been very good. In connection with the brick used for the Home of the Friendless we are taught a lesson in regard to the size of brick made for paving purposes. These brick being of the same size and form of the ordinary building brick, it was possible to use them on this work. We have noticed in this city that in some instances the hardest of paving brick have been used for facing above grade to the line of the first floor because of their non-absorbent qualities. Out of this accidental use of paving brick we may expect to see an increased market for this character of product. Then paving brick manufacturers will wish they had been content to make standard size brick instead of the large block.

LEGAL.

McCANN V. CITY OF TORONTO.—Judgment by Mr. Justice Street, upon question of liability of third parties to defendants. The plaintiff recovered judgment against defendants for $600 for damages sustained by her owing to their negligence in not having fastened a trap door in the roof of the tower of a fire hall in Dundas street, in the City of Toronto. The door was blown off as the plaintiff was passing along the highway, and, striking her on the head, inflicted the injuries of which she complained. The jury found that the plaintiff had been injured by the negligence of defendants in not properly securing the trap door. THEY ALSO FOUND, in answer to questions put to them at the request of the counsel for defendants (who disputed the liability of defendants for acts of negligence on the part of the contractors, Messrs. Phillips, the third parties, who had undertaken to erect and complete the building), THAT THE SPECIFICATIONS WERE SATISFIED WITHOUT THE PLACING OF FASTENINGS UPON THE TRAP-DOOR. The building had not been taken over from the contractors at the time the accident happened. The specifications required the contractors to leave a trap-door in the tower of the building, and to "provide trap and flagpole." The contract embodied the specifications by reference, and required the contractors to "find and provide such good, proper and sufficient materials of all kinds whatsoever as shall be proper and sufficient for completing and furnishing all the above mentioned works of said building shown on the said plans and mentioned in said specifications," and to furnish and perform all the work called for in a good workmanlike manner. There was also a stipulation that the corporation "will not in any manner be answerable or accountable . . . for the injury to any person or persons, either workmen or the public, . . from any cause which might have been prevented by the contractors . . . against all which injuries and damages . . . the contractors must properly guard and make good all damages from whatever cause . . and be strictly responsible for the same." The plan showed that the trap-door was to be placed upon a steep slope in the roof of the tower. By express agreement the learned judge was not to be bound by the findings of the jury except as to the amount of the damages. He finds, upon the evidence, that the contractors did not comply with their contract to complete and finish their work when they left the trap-door unsecured. It was as much a part of the roof as were the shingles, and it was as necessary to secure it properly as it was to put sufficient nails into the shingles. The result of this finding is that the corporation were not negligent and that the contractors were. The jury found the converse, and upon their finding that the corporation had net stipulated for the securing of the trap-door they were held liable and judgment was recovered against them. The result of the case is that they would not have been liable if the negligence which caused the accident had been that of the contractors. They were the land-owners, it is true, and the accident happened to one of the public upon the highway adjoining their land, and in the ecurse of construction of a building being erected

for them. But the corporation, having employed competent contractors to do the work, and having stipulated for its being properly done, the work itself being a lawful one, and not intrinsically dangerous to anyone, and not being in the nature of a nuisance, were not liable for an accident arising from the negligence of the contractors in carrying out their contract: Reedie v. London and Northwestern R. W. Co., 4 Ex. 244. The corporation are confronted with a dilemma. If the finding of the jury was right, the corporation cannot ask that the result of its own negligence should be visited upon the innocent contractors. If the finding of the jury was wrong, and the accident was due to the negligence of the contractors, then the corporation never was liable to the plaintiff at all, the contractors alone were liable, and therefore the corporation cannot recover over against them. Claim of defendants against third parties dismissed with costs. Fullerton, Q. C., for defendants.

TREMAINE VS. SUTCLIFFE.—This case, which recently came before the courts at Halifax, Nova Scotia, is one in which both architects and contractors will be interested. We therefore print in full the decision of Mr. Justice Weatherbe and his remarks bearing on the case, as follows:

This cause came on for trial before me at chambers. Part of the evidence was taken before me, and for the convenience of the parties and their counsel several adjournments took place and evidence was taken before a commissioner, who was the stenographer appointed in the case. After the evidence was completed written arguments were submitted by counsel.

The action is brought to recover remuneration for the plaintiff's services as architect on an agreement to pay two per cent. for plans and specifications and two per cent. for superintending the work.

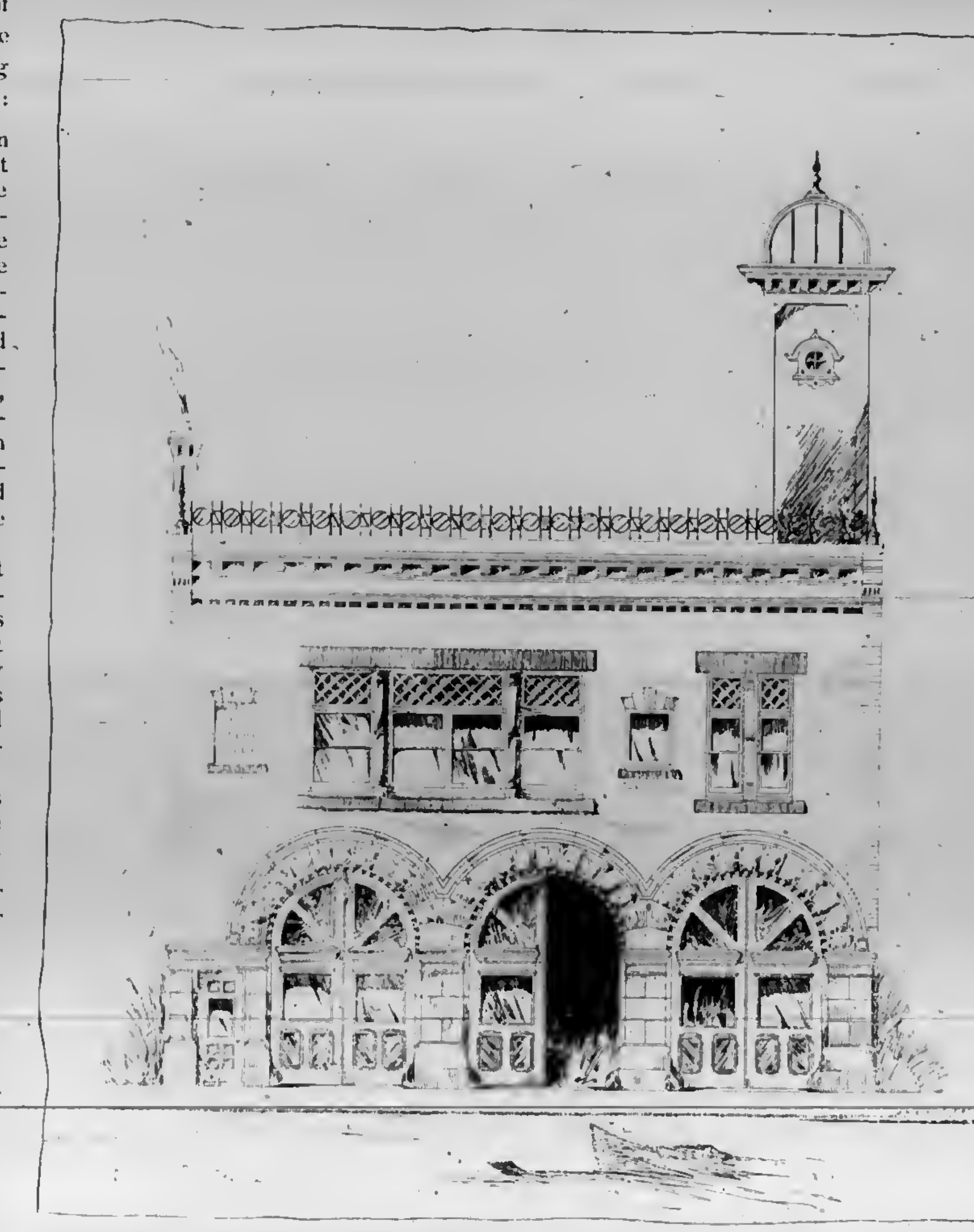
More than 150 pages of typewritten evidence has been taken, and a large portion of which deals with questions of opinion rather than of fact. The contention of defendant's counsel, which he endeavors industriously to support by numerous references to the evidence, is that the work of the plaintiff was unskillfully and negligently done both in preparing plans and specifications, and in superintending the work. Superintending the work would, I understand, embrace the properly and promptly advising the defendant in any difference of opinion between him and a contractor. It is argued for defendant that according to the plaintiff's own evidence carelessness and indifference are manifest from the very brief time spent at supervision as well as from the evidence of necessity of defendant's attendance to the supervision to prevent departure from the plans and specifications as also from what resulted during prosecution of the work. Defendant's counsel further contends that the agreement for commissions cannot be construed as plaintiff maintains to cover the whole outlay of defendant, and that, in fact, the amount upon which commission is claimed covers damages paid by defendant which resulted to an adjoining building during the prosecution of the work in question on rent paid for another building by defendants, on shelving in another building with which plaintiff had nothing to do, and never saw, on extras for which plaintiff did not prepare the plans nor supervise the work, and on the cost of vault doors, which latter would be treated on a different principle I suppose from the other items mentioned in this sentence. Defendant claims by way of counter-claim for the negligence, default and breach of contract specified above, and in addition complains that $300 or more were lost by the improper method of construction, approved of by the architect, of a glass house on top of the building, and also that plaintiff has certified for work not done or improperly done and for work in excess of what should have been certified and for his conduct in relation to what is alleged to be the unskillful and improper equipment of the building with electrical wiring, the subject in controversy to which the greater portion of the evidence is directed. Defendant claims that the wire itself is dangerous and therefore useless and that rewiring will cost over $500. It is obvious that though the wire is not dangerous, and even though the evidence brings it within the specifications this does not necessarily dispose of the question of negligence of the architect as to his duty in relation thereto.

I have reviewed not only the special evidence on which the defendant relies, but the whole of the voluminous mass of testimony and I have carefully examined plaintiff's counsel's statements by which he seeks to controvert the defendant's argument, and I cannot wholly agree with either of the counsel. I am called upon to apply and pass upon a large number of facts and conflicting opinions in the capacity of a juror and to form a conclusion upon the whole case, including the counter-claim. Though I am much impressed with the observation of defendant's counsel as to the character of the wire, and though I cannot avoid doubt, I am not able to pronounce it not in accordance with the contract.

Counsel refers to the indifference of the architect in the conflict between the defendant and the contractor on this subject. I was much struck with the evidence of Mr. Brookfield. The architect seems to have permitted a very experienced and persistent contractor to almost usurp his functions in collecting information and advising the defendant not only in regard to the wiring but in respect of other subjects where controversy and difference of opinion arose. Indeed this indifference or rather, want of firmness and promptitude, perhaps the not unnatural result of inexperience, this lack of firmness or whatever it may be termed, which has evidently caused defendant a great amount of annoyance and trouble, is so prominent in the evidence as to have raised doubts whether I should not have wholly disallowed the plaintiff's claim. I regard this as a matter which might have been before a jury wholly within their province.

In, however, deciding for plaintiff I do not so decide upon the construction of the contract to the extent urged on his behalf for the amount of commissions on the sum on which plaintiff's claim is based. Upon the view left open to me to take I award him in addition to the $100 paid into court $351, or $451 in all, instead of the sum claimed (526.68). There remains the question of costs in connection with the circumstances attending the conduct of the plaintiff already referred to. I cannot escape the conviction that the defence set up, and the counter-claim arose out of circumstances all attributable to the attitude and conduct of plaintiff, and therefore there should be no costs.

In view of my decision, at which I have arrived with so much hesitation, being reviewed at the instance of either party, I wish to add that there was nothing in the demeanor of the parties to the suit or those witnesses who gave their evidence in court which afforded me any advantage over a judge who may have to rely alone on the perusal of the evidence.



NORTH END FIRE ENGINE HOUSE, ST. JOHN, N.B.—R. C. JOHN DUNN, ARCHITECT.

The new building designed by Mr. F. M. Rattenbury, architect, for the Bank of Montreal, at Victoria, B. C., is now ready for occupation. The banking room measures 60 x 40 feet, with an 18 foot ceiling. The walls are pannelled with Tennessee marble in a variety of shades. The woodwork is of walnut, enriched by excellent carving. The floors are laid with mosaic. The contractors were all local men, the stonework being executed by Messrs. McGregor & Jeeves, the plastering by Mr. Richard Drake, the interior walnut fittings by Weiler Bros., the tiles supplied by Mr. Anderson, and the leaded glass work by Mr. E. W. Morris.

SAFE SPANS FOR WOODEN FLOOR JOISTS, CEILING JOISTS AND RAFTERS IN BUILDINGS.*

REALIZING the important part played by labor-saving devices in the economy of the industries of this age, the writer has for several years given much thought to the preparation of tables for the strength of building materials, which, while safe and reliable, can also be readily understood and used by any architect or intelligent builder.

Even to those who are familiar with the formulæ and data used in determining the strength of materials, such tables are of great help, as they enable one not only to determine more quickly the size required, but also to see at a glance the size which can most economically be used.

Tables for the strength of beams are given in several handbooks, but as yet the writer has seen no tables which show at a glance the size of wooden joist to be used with the ordinary method of framing. To supply this want the following tables were prepared, and it is believed that they will be found applicable to nine-tenths of the buildings in which wooden joist are used.

As the joist are sawn to regular sizes, and it is a very common custom to space them either 12 or 16 inches on centres, the span and load are the only variable terms.

The following tables give the maximum span for which the different sizes of joist should be used with spacings of 12 and 16 inches, so that knowing the size of room to be covered, the size of the joist can be told at a glance.

If, owing to the room being irregular in shape, the joists must be of different lengths, the spacing or thickness of the joists may be varied, so that the same depth may be used throughout.

Values for the four different woods most commonly used are also given.

The only precautions to be exercised in using these tables are in regard to the superimposed load and the actual size of the timbers.

The superimposed loads for which the maximum spans have been computed are given at the head of each table. The load to be assumed for any given building is to a large extent a matter of judgment, as circumstances may demand a higher limit for one building than for another, even of the same general class. In general the tables may be considered safe for the classes of buildings indicated.

In some localities framing lumber is often sawn a little scant in both thickness and depth, and wherever such is the case a corresponding reduction must be made in the safe span. A reduction should also be made for any cutting of the joist that may be required.

Tables A to E, inclusive, were computed by the formula for stiffness, on the assumption that the deflection should not exceed 1-30 of an inch per foot of span. Tables F, G and H were computed by the formula for strength.

No allowance has been made for partitions, and when they are to be supported by the floor joist additional joist should be used, or the span reduced according to the relative direction or position of the partition and joists.

The spans given in these tables come within the requirements of the New York and Buffalo building laws, and tables A, C, D, E, G and H comply with the Chicago law, but to comply with the Boston law (which the writer considers very unreasonable) a reduction of about one-sixth must be made from the spans given.

By Georgia pine is meant the long-leaf, yellow or hard pine.

* F. E. Kidder in Architecture and Building.

TABLE A.
MAXIMUM SPAN FOR CEILING JOISTS.
Superimposed load, 5 pounds per square foot.

Size of Joist.	Dist. on Centres.	White Pine.		Spruce.		Oregon Pine.		Georgia Pine.	
	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
2 X 4	12	9	11	10	7	10	11	11	10
2 X 4	16	9	0	9	7	9	11	11	1
2 X 6	12	14	7	15	7	16	1	17	3
2 X 6	16	13	3	14	2	14	7	15	10
2 X 8	12	19	0	20	6	21	1	22	8
2 X 8	16	17	5	18	8	19	3	20	8
2 X 10	12	23	6	25	2	26	0	27	11
2 X 10	16	21	7	23	0	23	10	25	7
2 X 12	12	27	0	28	10	29	8	32	0
2 X 12	16	25	0	26	8	27	6	29	7

TABLE B.
MAXIMUM SPAN FOR FLOOR JOISTS.
DWELLINGS, TENEMENTS AND GRAMMAR SCHOOL ROOMS WITH FIXED DESKS.
Superimposed load, 40 pounds per square foot.

Size of Joist.	Dist. on Centres.	White Pine		Spruce.		Oregon Pine.		Georgia Pine.	
	In.	Ft.	In.	Ft	In	Ft.	In.	Ft	In.
2 X 6	12	9	10	10	6	10	10	11	8
2 X 6	16	9	0	9	7	9	11	10	8
2 X 8	12	13	0	13	11	14	5	15	6
2 X 8	16	11	11	12	10	13	2	14	2
2 X 10	12	16	2	17	3	17	11	19	0
2 X 10	16	14	11	15	11	16	5	17	6
3 X 10	12	18	3	19	6	20	2	21	5
3 X 10	16	16	10	18	0	18	7	19	8
2 X 12	12	19	5	20	8	21	5	22	8
2 X 12	16	17	10	19	0	19	7	20	11
3 X 12	12	21	10	23	3	24	1	25	6
3 X 12	16	20	1	21	6	22	2	23	7
2 X 14	12	22	6	24	0	24	10	26	3
2 X 14	16	20	8	22	1	22	10	24	2
2½ X 14	12	24	0	25	7	26	5	28	0
2½ X 14	16	22	1	23	7	24	5	25	11
3 X 14	12	25	2	26	11	27	10	29	6
3 X 14	16	23	3	24	11	25	8	27	3

TABLE C.
MAXIMUM SPAN FOR FLOOR JOISTS.
OFFICE BUILDINGS.
Superimposed load, 70 pounds per square foot.

$l = \sqrt{\frac{8}{35} fbh^2}$

Size of Joist.	Dist. on Centres.	White Pine.		Spruce.		Oregon Pine.		Georgia Pine.	
	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In
2 X 10	12	14	2	15	2	15	7	16	10
2 X 10	16	13	0	13	11	14	3	15	5
3 X 10	12	16	1	17	2	17	8	19	1
3 X 10	16	14	8	15	8	16	2	17	6
2 X 12	12	17	0	18	1	18	8	20	1
2 X 12	16	15	6	16	7	17	1	18	5
3 X 12	12	19	2	20	6	21	2	22	10
3 X 12	16	17	7	18	10	19	6	20	11
2 X 14	12	19	10	21	1	21	10	23	5
2 X 14	16	18	1	19	3	19	11	21	6
2½ X 14	12	21	1	22	7	23	3	24	11
2½ X 14	16	19	5	20	8	21	5	22	11
3 X 14	12	22	5	23	10	24	7	26	3
3 X 14	16	20	6	21	11	22	7	24	1

TABLE D.
MAXIMUM SPAN FOR FLOOR JOISTS.
CHURCHES AND THEATRES WITH FIXED SEATS.
Superimposed Load, 80 lbs. per square foot.

$l = \sqrt{\frac{8}{40} fbh^2}$

Size of Joist.	Dist. on Centres.	White Pine.		Spruce.		Oregon Pine.		Georgia Pine.	
	In.	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.
2 X 10	12	13	8	14	7	15	1	16	2
2 X 10	16	12	6	13	5	13	10	14	11
3 X 10	12	15	6	16	7	17	1	18	3
3 X 10	16	14	2	15	2	15	8	16	10
2 X 12	12	16	5	17	6	18	1	19	3
2 X 12	16	15	0	16	0	16	6	17	8
3 X 12	12	18	5	19	11	20	6	21	11
3 X 12	16	17	0	18	2	18	10	20	1
2 X 14	12	19	1	20	5	21	0	22	5
2 X 14	16	17	5	18	7	19	2	20	6
2½ X 14	12	20	5	21	10	22	6	24	0
2½ X 14	16	18	8	20	0	20	7	22	1
3 X 14	12	21	7	23	1	23	10	25	5
3 X 14	16	19	10	21	1	21	10	23	3

TABLE E.
MAXIMUM SPAN FOR FLOOR JOISTS.
ASSEMBLY HALLS AND CORRIDORS.
Superimposed load, 100 pounds per square foot.

$l = \sqrt{\frac{8}{50} fbh^2}$

Size of Joist.	Dist. on Centres.	White Pine		Spruce.		Oregon Pine.		Georgia Pine.	
	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.
2 X 10	12	12	11	13	10	14	2	15	3
2 X 10	16	11	10	12	7	13	0	14	0
3 X 10	12	14	7	15	8	16	2	17	3
3 X 10	16	13	5	14	3	14	10	15	11
2 X 12	12	15	5	16	6	17	0	18	3
2 X 12	16	14	1	15	1	15	7	16	8
3 X 12	12	17	6	18	8	19	3	20	8
3 X 12	16	16	1	17	2	17	8	19	0
2 X 14	12	18	0	19	2	19	10	21	2
2 X 14	16	16	5	17	7	18	1	19	5
2½ X 14	12	19	3	20	7	21	2	22	8
2½ X 14	16	17	7	18	10	19	5	20	10
3 X 14	12	20	5	21	10	22	6	24	0
3 X 14	16	18	8	20	0	20	7	22	0

TABLE F.
MAXIMUM SPAN FOR FLOOR JOISTS.
RETAIL STORES.
Superimposed load, 150 pounds per square foot.

$l = \sqrt{\frac{8}{75} fbh^2}$

Size of Joist.	Dist. on Centres.	White Pine		Spruce.		Oregon Pine.		Georgia Pine.	
	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
2 X 10	12	12	3	12	8	14	6	15	2
2 X 10	16	10	8	11	1	12	7	13	2
3 X 10	12	14	11	15	6	17	7	18	11
3 X 10	16	13	0	13	6	15	3	16	1
2 X 12	12	14	8	15	3	17	3	18	2
2 X 12	16	12	10	13	3	15	1	15	10
3 X 12	12	17	10	18	6	21	0	22	0
3 X 12	16	15	7	16	2	18	3	19	2
2 X 14	12	17	1	17	10	20	1	21	1
2 X 14	16	14	11	15	6	17	6	18	5
2½ X 14	12	19	0	19	10	22	4	23	5
2½ X 14	16	16	7	17	2	19	6	20	6
3 X 14	12	20	8	21	6	24	5	25	6
3 X 14	16	18	1	18	10	21	2	22	3

TABLE G.
MAXIMUM SPAN FOR RAFTERS.
PITCHED ROOFS, SHINGLED.
External load, 40 pounds per square foot.

Size of Joist.	Dist. on Centres.	White Pine.		Spruce.		Oregon Pine.		Georgia Pine.	
	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
2 X 4	16	8	1	8	5	9	6	10	0
2 X 4	20	7	3	7	7	8	6	9	0
2 X 6	16	12	0	12	6	14	2	14	11
2 X 6	20	10	10	11	3	12	10	13	6
2 X 8	16	16	0	16	7	18	10	19	5
2 X 8	20	14	5	14	11	16	11	17	11
2 X 8	24	13	1	13	7	15	6	16	3
2 X 10	16	19	10	20	7	23	3	24	7
2 X 10	20	17	11	18	7	21	0	22	2
2 X 10	24	16	5	16	11	19	2	20	3

TABLE H.
MAXIMUM SPAN FOR RAFTERS.
SLATE ROOFS AND FLAT ROOFS.
External load, 40 pounds per square foot.

Size of Joist.	Dist. on Centres.	White Pine.		Spruce.		Oregon Pine.		Georgia Pine.	
	In.	Ft.	In	Ft.	In.	Ft	In.	Ft.	In
2 X 4	16	7	7	7	11	9	0	9	6
2 X 4	20	6	10	7	1	8	0	8	6
2 X 6	16	11	5	11	8	13	5	14	1
2 X 6	20	10	2	10	7	12	0	12	8
2 X 8	16	15	1	15	7	17	8	18	8
2 X 8	20	13	7	14	1	16	0	16	10
2 X 8	24	12	5	12	10	14	7	15	5
2 X 10	16	18	8	19	5	22	0	23	2
2 X 10	20	16	6	17	6	19	10	20	11
2 X 10	24	15	5	16	0	18	1	19	1

The Toronto Evening Star remarks that by some strange oversight the Toronto Trades and Labor Council has neglected to condemn the management of the six-day bicycle race for working the men over-time.

There is quite a knack in filling open grain woods right, such as ash and oak, and species of mahogany. The average painter rubs off the filler in any way. It should be rubbed across the grain, and then in a careful manner, so as not to rub it out again.

THE PLUMBERS' AND STEAMFITTERS' SUPPLY ASSOCIATION.

THE annual meeting of the above association was held in Toronto on the 8th inst., and was well attended. Owing to the death of his brother, Mr. John McMichael, the president, Mr. A. A. McMichael, of the James Robertson Company, was unable to be present, and in his absence Mr. A. J. Somerville acted as chairman. A resolution of sympathy with Mr. McMichael was passed and ordered to be forwarded to him. The annual statement of the association was read, which showed the finances to be in a very healthy state. The election of officers for the ensuing year resulted as follows: President, Mr. James Morrison, of the James Morrison Brass Mfg. Co.; vice-president, Mr. A. J. Somerville, of the Ontario Lead and Barb Wire Company; secretary-treasurer, Mr. A. G. Booth, of the Steel-Clad Bath Company. Several matters of general interest were discussed at length, and one new member was proposed and accepted.

After the business had been finally disposed of, an adjournment was made to another room, where lunch had been provided by Mr. Williams, of the Bodega. After brief speeches the meeting dispersed.

STRENGTH OF STONES UNDER PRESSURE.

STUDENTS of geology who are no longer young may remember the interest excited when they first read of the experiments of Gregory Watt on basalt, says the London Architect. He melted some blocks. Those which were cooled quickly formed a sort of glass resembling slag. Those which were cooled more slowly assumed at first the form of globules, which increased in size and became balls of equal sizes. A layer of the balls was subjected to pressure in every direction, and it was found that every ball became squeezed into a regular hexagon. It was concluded that the columnar structure of basalt was due to immense forces operating similarly. Experiments no less interesting have been conducted by Messrs. Adams and Nicholson in McGill University, and some of the results were brought under the notice of the meeting of the British Association at Toronto. The object was to ascertain whether it is possible, by subjecting rocks artificially to pressure under the conditions which obtain in the deeper parts of the earth's crust, to produce in them the deformation and cataclastic structures exhibited by the folded rocks of the interior of mountain ranges or of the older formations of the earth. The experiments have been made chiefly with pure Carrara marble. Columns of the marble 2 centimeters and 2½ centimeters in diameter and about 4 centimeters in length were very accurately turned and polished. Heavy wrought-iron tubes were then made, imitating the plan adopted in the construction of ordnance, by rolling long strips of Swedish iron around a bar of soft wrought-iron, and welding the strips to the bar as they were rolled around it. The core of soft iron composing the bar was then drilled out, leaving a tube of welded Swedish iron 6 millimeters thick, so constructed that the fibers of the iron run around the tube, instead of being parallel to its length. This tube was then very accurately fitted onto the column of marble. This was accomplished by giving a very slight taper to both the column and the interior of the tube, and so arranging it that the marble would pass only about half way into the tube when cold. The tube was then expanded by heating, so as to allow the

marble to pass completely into it, and leave about three centimeters of the tube free at either end. On allowing the tube to cool a perfect contact between the iron and marble was obtained, and it was no longer possible to withdraw the latter. Into either end of the tube containing the small column an accurately fitting sliding steel plug was inserted, and by means of these the marble was submitted to a pressure far above that which would be sufficint to crush it if not so enclosed. Under the pressure, which was applied gradually and in some cases continued for several weeks, the tube was found to slowly bulge until a very marked enlargement of the portion surrounding the marble had taken place. The tube was then cut through longitudinally by means of a milling machine along two lines opposite to one another. The marble within, however, was still firm, and held the respective sides of the iron tube, now completely separated, so tightly together that it was impossible without mechanical aids to tear these apart. By means of a wedge, however, they could be separated, splitting the marble through longitudinally. The column in one experiment was reduced from 40 millimeters to 21 millimeters in height. The deformed marble differs from the original rock in having a dead white color, the glistening cleavage faces of calcite being no longer visible, and although not so hard as the original rock, it is still firm and compact, and especially so when its deformation has been carried out very slowly. The experiments show that limestone, even when dry and at ordinary temperatures, does possess a certain degree of plasticity, and can be made to "flow," the movements set up developing many structures which are characteristic of rocks which have been squeezed or folded in the deeper portions of our earth's crust. It is to be hoped Messrs. Adams and Nicholson will continue their experiments, for in addition to their geological interest they suggest that much remains to be known about the strength of marble under constant pressure, and, it may be, about other materials also.

POLISHING MARBLE.

POLISHING includes five operations. Smoothing the roughness left on the surface is done by rubbing the marble with a piece of moist sandstone; for mouldings either wooden or iron mullers are used, crushed and wet sandstone, or sand, more or less fine, according to the degree of polish required, being thrown under them. The second process is continued rubbing with pieces of pottery without enamel, which have only been baked once, also wet. If a brilliant polish is required, Gothland stone instead of pottery is used, and potters' clay or fullers' earth is placed beneath the muller. This operation is performed upon granites and porphyry with emery and a lead muller, the upper part of which is encrusted with the mixture until reduced by friction to clay or impalpable powder. As the polish depends almost entirely upon these two operations, care must be taken that they are performed with a regular and steady movement. When the marble has received the first polish, the flaws, cavities, and soft spots are sought out and filled with mastic of a suitable color. This mastic is usually composed of a mixture of yellow wax resin and Burgundy pitch, mixed with a little sulphur and plaster passed through a fine sieve, which gives it the consistency of a thick paste; to color this paste to a tone analogous to the ground tints or natural cement of the material upon which it is placed, lamphlack and rouge, with a little of the prevailing color of the material, are added. For green and red marbles, this mastic is sometimes made of gum lac, mixed with Spanish sealing wax of the color of the marble. It is applied with pincers, and these parts are polished with the rest. Sometimes crushed fragments of the marble worked are introduced into the cement, but for fine marbles, the same colors are employed which are used in painting, and which will produce the same tone as the ground; the gum lac is added to give it body and brilliancy. The third operation in polishing consists in rubbing it again with a hard pumice stone, under which water is being constantly poured, unmixed with sand. For the fourth process, called softening the ground, lead filings are mixed with the emery mud produced by the polishing of mirrors, or the working of precious stones, and the marble is rubbed by a compact linen cushion well saturated with this mixture; rouge is also used for this polish. For some outside works, and for hearths and paving tiles, marble workers confine themselves to this polish. When the marbles have holes or grains, a lead muller is substituted for the linen cushion. In order to give a perfect brilliancy to the polish the gloss is applied. Well wash the prepared surfaces and leave them until perfectly dry, then take a linen cushion, moistened only with water, and a little powder of calcined tin of the first quality. After rubbing with this for some time, take another cushion of dry rags, rub with it lightly, brush away any foreign substance which might scratch the marble, and a perfect polish will be obtained. A little alum mixed with the water used penetrates the pores of the marble, and gives it a speedier polish. This polish spots very easily, and is soon tarnished and destroyed by dampness. It is necessary when purchasing articles of polished marbles to subject them to the test of water; if there is too much alum the marble absorbs the water and a whitish spot is left.

MANUFACTURES AND MATERIALS

Mr. Thomas Whittaker, of Toronto, is reported to have discovered a large deposit of fire clay on lands owned by him in the Nipissing district. The material is said to have undergone analysis by the government expert, and is declared to be genuine. A company is said to be in process of formation to utilize the material.

The Ontario Peat Fuel Company, of Welland, have recently patented a method for the manufacture of artificial marble from gypsum. There is said to be an abundant supply of the mineral on the Grand River. A factory is now being fitted up in Toronto for the manufacture of the new material, regarding which further particulars will shortly be given.

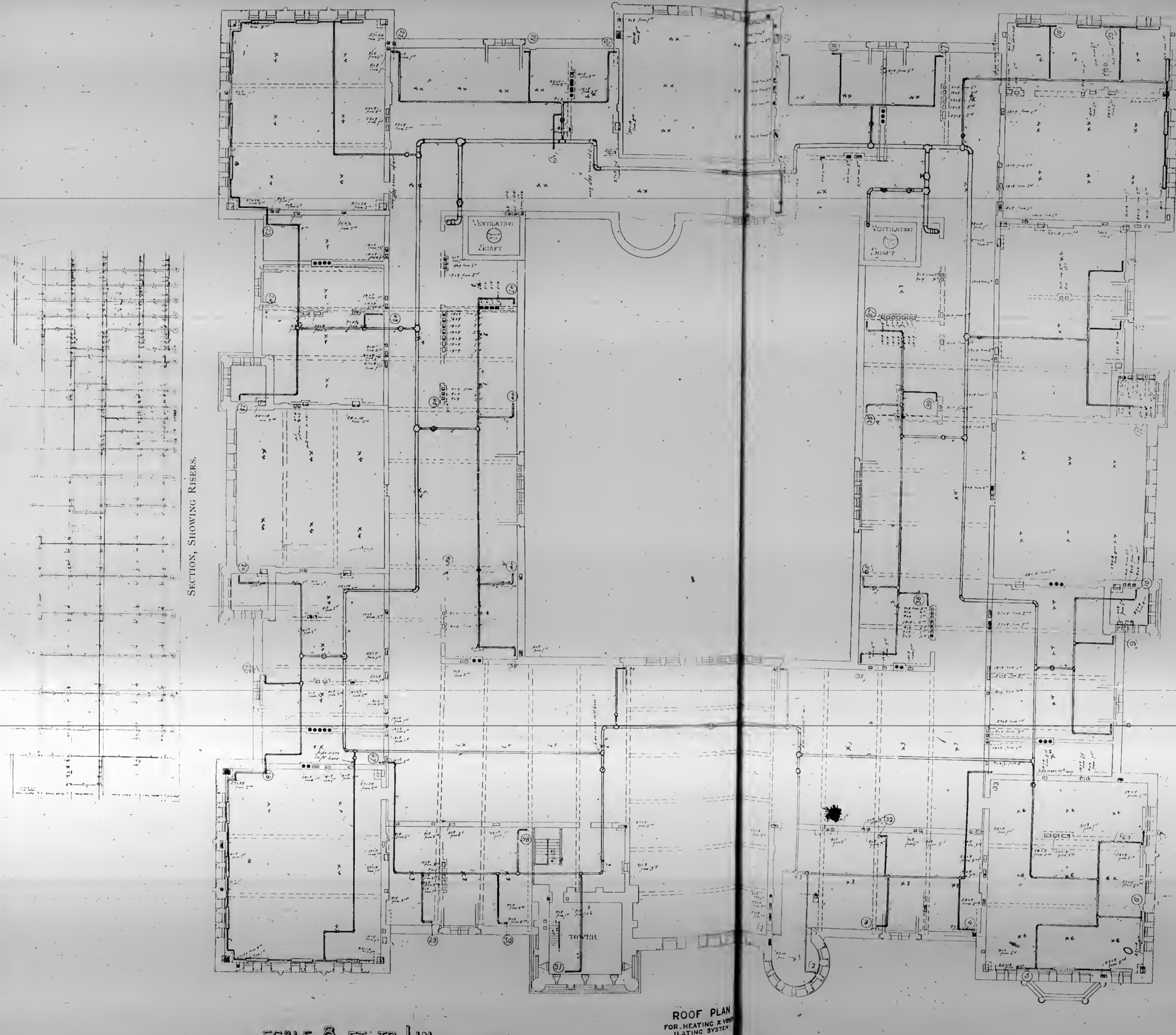
Messrs. Henry Maurer & Son, of New York, have patented in Canada and other countries a brick which is said to be absolutely fire-proof, and, though dense in appearance, has the quality of allowing nails to be driven into it without causing chipping and the further quality of "holding" the nails so that it is with much difficulty that they can be withdrawn.

The Sprague Elevator Co., of New York, represented in Canada by Jack & Robertson, of Montreal, are reported to have recently received from the Central London Railway of London, Eng., the largest elevator contract on record. It includes 49 elevators erected in twenty-five different underground shafts, and distributed over six miles of route.

Teacher (to pupils)—"Who was Moses?" Truthful Tommy, at the back end of the class, signals eagerly. Teacher—"Well?" T. T.—"He was the man wot told the brickmakers to go on strike when Pharaoh wanted to sweat 'em."

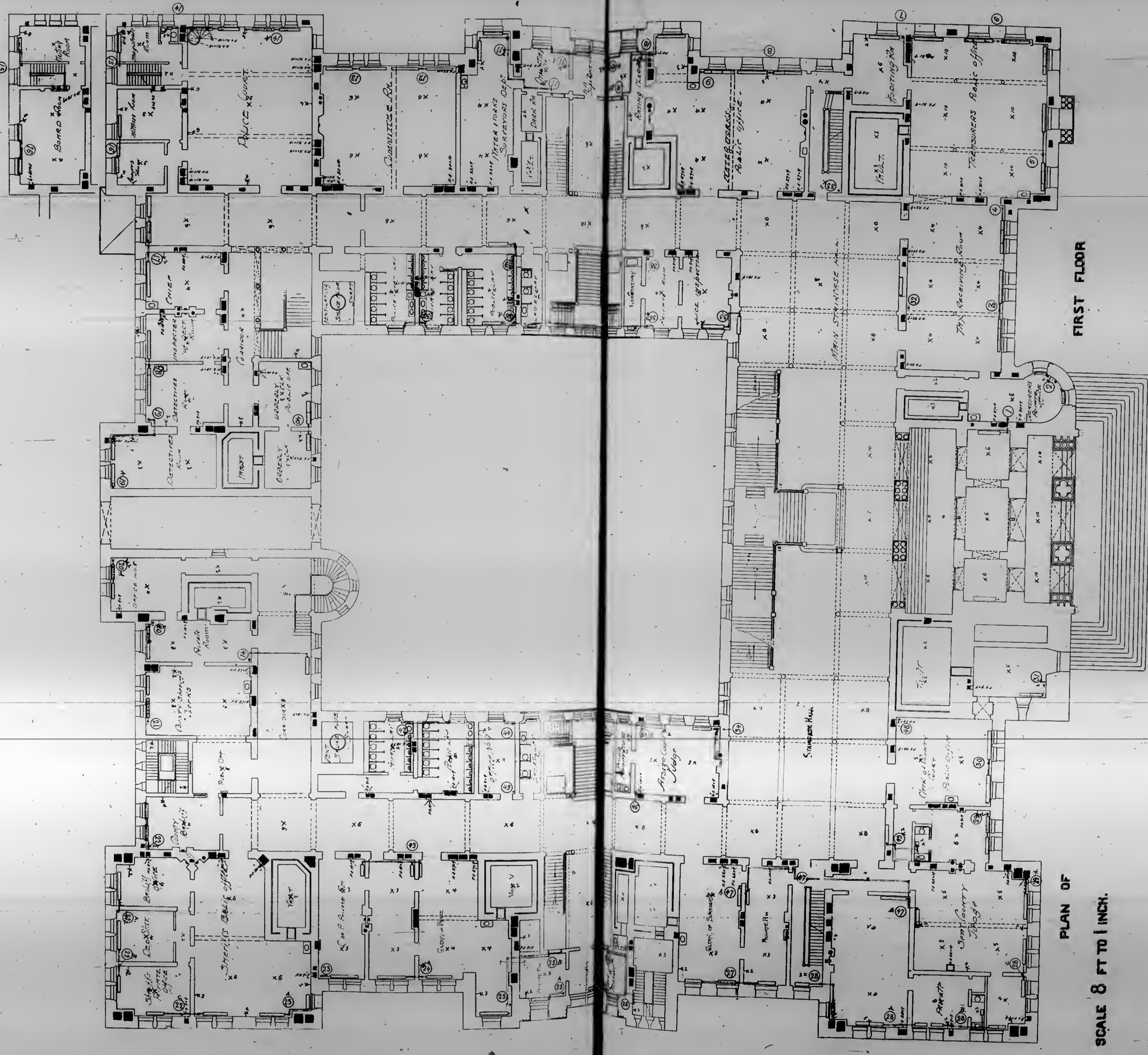
KNOX C[illegible]H, WOODSTOCK, ONT.

BURK[illegible]RWOOD, ARCHITECTS.



Plans Showing Plumbing, Heating and Ventilating Systems, New Municipal Buildings, Toronto.

E. J. Lennox, Architect.



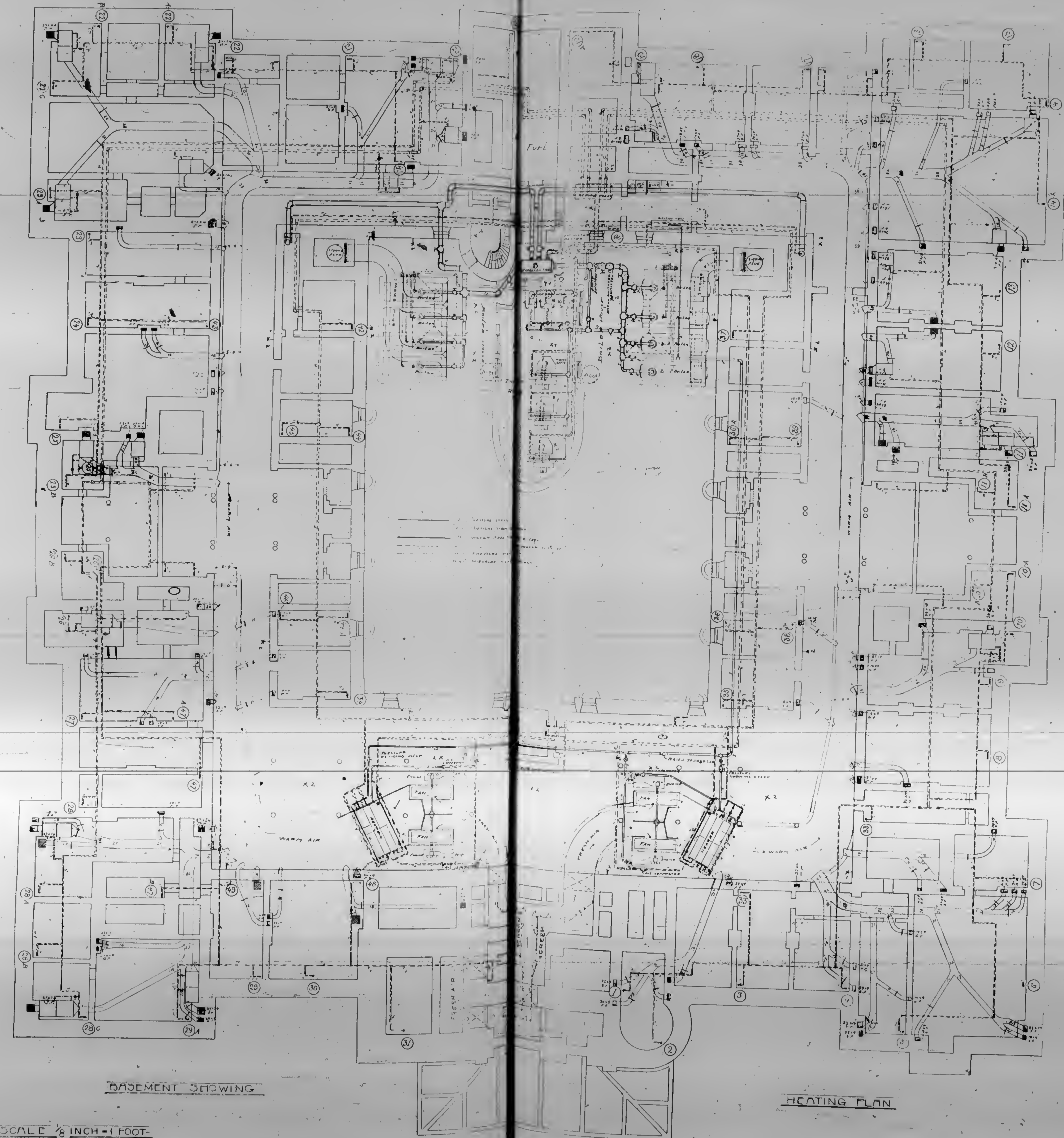
FIRST FLOOR

PLAN OF

SCALE 8 FT TO 1 INCH.

PLANS SHOWING PLUMBING, HEATING AND VENTILATING SYSTEMS, NEW MUNICIPAL BUILDINGS, TORONTO.

E. J. LENNOX, ARCHITECT.



PLANS SHOWING PLUMBING, HEATING AND VEN[illegible] SYSTEMS, NEW MUNICIPAL BUILDINGS, TORONTO.

E. J. [illegible] ARCHITECT.

CANADIAN

ARCHITECT AND BUILDER

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CANADIAN ARCHITECT AND BUILDER.

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EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this Journal is published are cordially invited. Subscribers are also requested to forward newspaper-clippings or written items of interest from their respective localities.

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The Proposed Victoria Square. THE proposition which has been made to establish a public square opposite the new municipal buildings, Toronto, has been referred to on several previous occasions. If the favorable conditions which at present exist for carrying out the scheme are allowed to pass, a golden opportunity of increasing the attractiveness of the city will have been forever lost. In the hope that the newly installed City Council may be induced to turn their attention to the project in a practical way, we publish a perspective view which in a measure serves to show the great improvement which would be effected by thus establishing a public square in the heart of the business portion of the city, and removing the unsightly structures which at present render it impossible to obtain a satisfactory view of the new City Buildings. We trust that the recently organized Guild of Civic Art, and all other persons interested in the attractiveness and welfare of the city, will unite in an endeavor to have this necessary improvement carried out.

This Number. IN presenting to our readers this New Year number, we desire gratefully to acknowledge our indebtedness to the gentlemen who have given us valuable assistance in its preparation. These include Mr. T. R. Johnston, of New York, author of our cover design; Mr. Keele, of the School of Practical Science; Prof. Capper, of McGill University; Mr. G. A. Reid, R.C.A., of Toronto; Mr. Fred. T. Hodgson, Collingwood; Mr. Ormsby Graydon, City Engineer, London, Ont., and the various manufacturing and supply companies, for photographs from which the group of portraits in our illustrated pages is reproduced. It is a matter of regret to us, as it certainly will be to our readers, that our persuasive ability proved unequal to the task of securing photographs of two or three of the larger concerns, whose modesty is only equalled by their enterprise. The amount of space required for the report of the proceedings of the O. A. A. convention has necessitated postponement of the publication of specially prepared and interesting articles designed for this number. For the same reason we are compelled to defer publication of the interesting papers submitted at the convention. We are pleased to be able to present brief biographical sketches and portraits of the executive officers of the newly organized Builders' Exchange of Montreal, and to be able to state that the new association is now in working order, and to all appearance is destined to be a potent factor in promoting the welfare of the building interests in the metropolitan city of Canada. Architects, builders, manufacturing and supply firms, and all who in any way are connected with the building interests, are congratulated on the promising outlook for the new year.

THE LONDON BUILDING DISASTER.

WE publish herewith a photographic reproduction, showing the interior of the Assembly Hall in the City Hall at London, Ont., the floor of which collapsed on January 3rd, resulting in the death of 23 persons and injury to upwards of 70. On next page is given a structural plan, on which are marked the dimensions of joists and of the beam, the failure of which was the immediate cause of the disaster. The area of broken floor was 22 × 28 feet = 616 square feet. The supporting beam was 12″ × 14″, made up of four pieces (3″ × 12″) spiked together with ordinary cut nails. The depth was 14″, width 12″, encased with 1″ sheeting. The beam was not supported in the centre, but rested on the brick walls at each end, and had a bearing of 12″ at each end. The clear span was 21′ 1 1-5″; there were brick walls on the four sides. The estimated number of people on the floor at the time of the accident was about 250.

With the aid of the plan and figures, it becomes an easy matter to figure out the strength of the structure, and we shall be pleased to publish the views of architects and others on this point. It is our purpose in a future issue to consider at greater length than the space available in this number will permit, this and other phases of this important matter. Meanwhile, we direct the attention of our readers to the subjoined letter of Mr. S. H. Townsend.

PHOTOGRAPHIC VIEW OF THE RECENT BUILDING DISASTER AT LONDON, ONT.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Apropos of the verdict of the Coroner's Jury in the London City Hall disaster, will you permit me to ask through the medium of your valuable journal what constitutes "ordinary care" in the construction of floors of public buildings, as understood by this Jury? The practice in most of our leading offices would place the maximum safe load for a sound pine beam, 12 inches by 14 inches and 22 feet bearing, at about....... 15,000 lbs.

Deduct from this amount the weight of floor and ceiling—600 square feet divided by 2 = 300 sq. ft., at 25 lbs. per square foot...... 7,500 lbs.

And of the beam itself, 12 inches by 14 inches by 22 feet, equals 25⅔ cubic feet, at 25 lbs. per cubic foot, a total of .... 640 lbs.

8,140 lbs.

And there remain............ .... 6,860 lbs.

or say, about 7,000 lbs. of the safe load available to carry the superimposed load on 600 square feet of floor, divided by 2, or a little more than 23 lbs. per square foot—about one-half what good practice demands for the floor of an ordinary dwelling house.

But the evidence shows that the beam was not sound. Engineer Graydon in his evidence says: "The effective strength of the beam is reduced one-fifth to one-quarter by knots and other defects," while another witness puts the loss from this cause as high as ⅓. Assuming ¼ to be correct, the amount of the safe load available for the support of the superimposed load is reduced to about 3,100 lbs., or a little over 10 lbs. per square foot, and yet this enlightened Jury finds, "that the said occurrence was purely accidental," and "that more than ordinary care was used" in the construction of and selection of the material for the beam.

Is it not time that the public was protected from a system of dealing with our public buildings, in which "more than ordinary care" produces such results? Other buildings in which the public assemble in large numbers, and which have been built and altered much in the same manner as the London City Hall, exist all over the country. What guarantee is there that many of them are not in a similar condition?

Possibly there may be a case in which the officials, in making some similar alterations, have used only "ordinary care." If so, to what extent would it be safe for to use it at all?

That grave danger to life exists in many of the buildings in which large meetings are held, and that year by year this danger is becoming greater, must be apparent to all who have given the subject any scientific study. It therefore becomes the duty of such papers as yours to push these facts home to all public spirited men in every way possible, and to urge upon them the vital necessity of immediately taking such steps as may be necessary to insure such a standard of scientific knowledge in those entrusted with the erection and maintenance of buildings of this nature, that the recurrence of such disasters will be an impossibility.

S. H. TOWNSEND,
Architect.

Toronto, Jan. 20th, 1898.

GOOD ADVICE.

The space given to display in advertising is never wasted if it's used judiciously. Handsome borders, good cuts, and up-to-date type are worth more than the space they occupy. White space, when it surrounds solid type, is always a good investment. But all display and no meat is a losing game. Many advertisers seem to think that a thing of beauty must be a profitable ad. That isn't true. People like to see pretty pictures and all that sort of a thing, but if you want to sell them anything you must tell them what it is, what it costs, and why they ought to buy it. If you have a page to say, say a page. If you have only a column to say, don't sprawl it over a page. If you have a double column to say, don't try to squeeze it into a column. Don't waste space by saying too little in it, and don't worse than waste it by overcrowding it.—Brains.

ILLUSTRATIONS.

ST. JAMES' METHODIST CHURCH, MONTREAL, QUE. A. F. DUNLOP, ARCHITECT.

TRINITY CHURCH, TRINITY SQUARE, TORONTO.—HENRY C. LANE, ARCHITECT.

COURT HOUSE, PORTAGE LA PRAIRIE, MAN.—GEORGE BROWNE, ARCHITECT.

SOME PROMINENT CANADIAN MANUFACTURERS OF BUILDING MATERIALS AND APPLIANCES.

THE MOLSONS BANK (ORIGINALLY RESIDENCE OF MR. CAWTHRA), TORONTO.—JOSEPH SHEARD, ARCHITECT.

PERSPECTIVE VIEW SHOWING EFFECT OF PROPOSED VICTORIA SQUARE, OPPOSITE NEW MUNICIPAL BUILDINGS, TORONTO.

EXTERIOR AND INTERIOR OF TRINITY CHURCH, (ANGLICAN) ST. JOHN, N. B.—W. T. THOMAS, ARCHITECT.

This church, in the Early English Gothic style, was erected in 1877, to replace Old Trinity, destroyed in the great fire. Old Trinity was originally built by the Loyalists, the founders of St. John, in 1783, and is claimed to have been the first church with a chancel in British North America. The dimensions of the present building are: Length, 150 feet; breadth, 62 feet; depth, of chancel, 40 feet; height of tower and spire, 210 feet.

BAPTIST CHURCH, RAT PORTAGE, ONT.—BURKE & HORWOOD, ARCHITECTS.

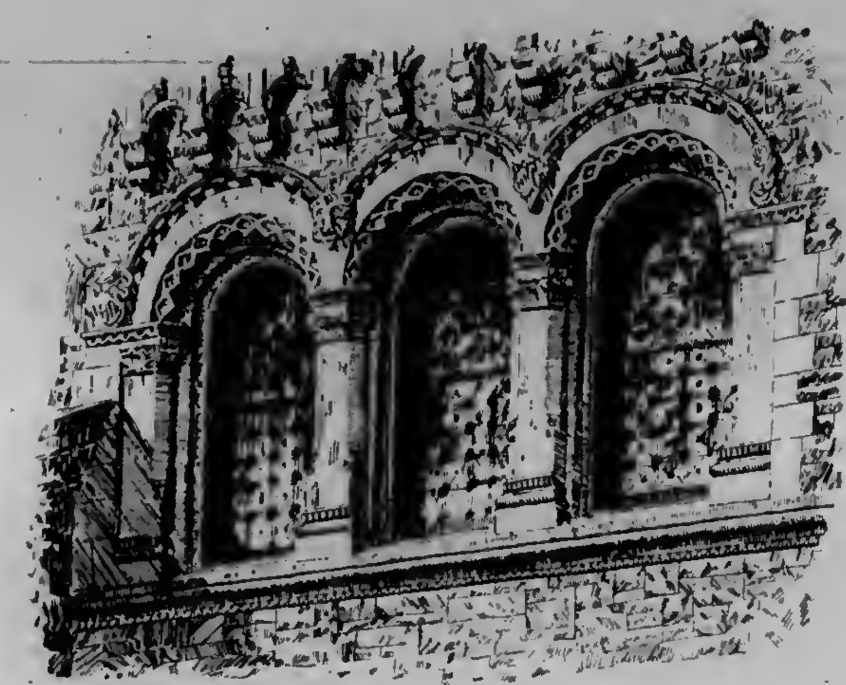
The site is of peculiar form and cramped dimensions, dictating the plan adopted, and necessitating a basement school room. The basement is built of granite, while the superstructure is frame, cased with brick.

RESIDENCE OF HON. HUGH J. MACDONALD, WINNIPEG, MAN.—CHAS. H. WHEELER, ARCHITECT.

This building, which is situated on Carlton street, just south of Broadway, in the best residential part of the city, is built of red pressed brick with Calgary bluish gray sandstone dressings, with local stone basement. Entrance hall and dining room are finished in quartered oak, floors, wainscot and ceilings, drawing room and best bedroom in cream enamel, smooth finish—the rest of the woodwork in British Columbia cedar. A very handsome stained glass window adorns the stair hallway. The bath room is fitted with enamelled baths, etc., with cream colored hall tiles. All plumbing is elaborate. The house is heated with hot water. In the roomy basement are laundries, drying room, w. c., wine and other cellars. Gas, bells, electric fittings throughout. Cost about $10,000.

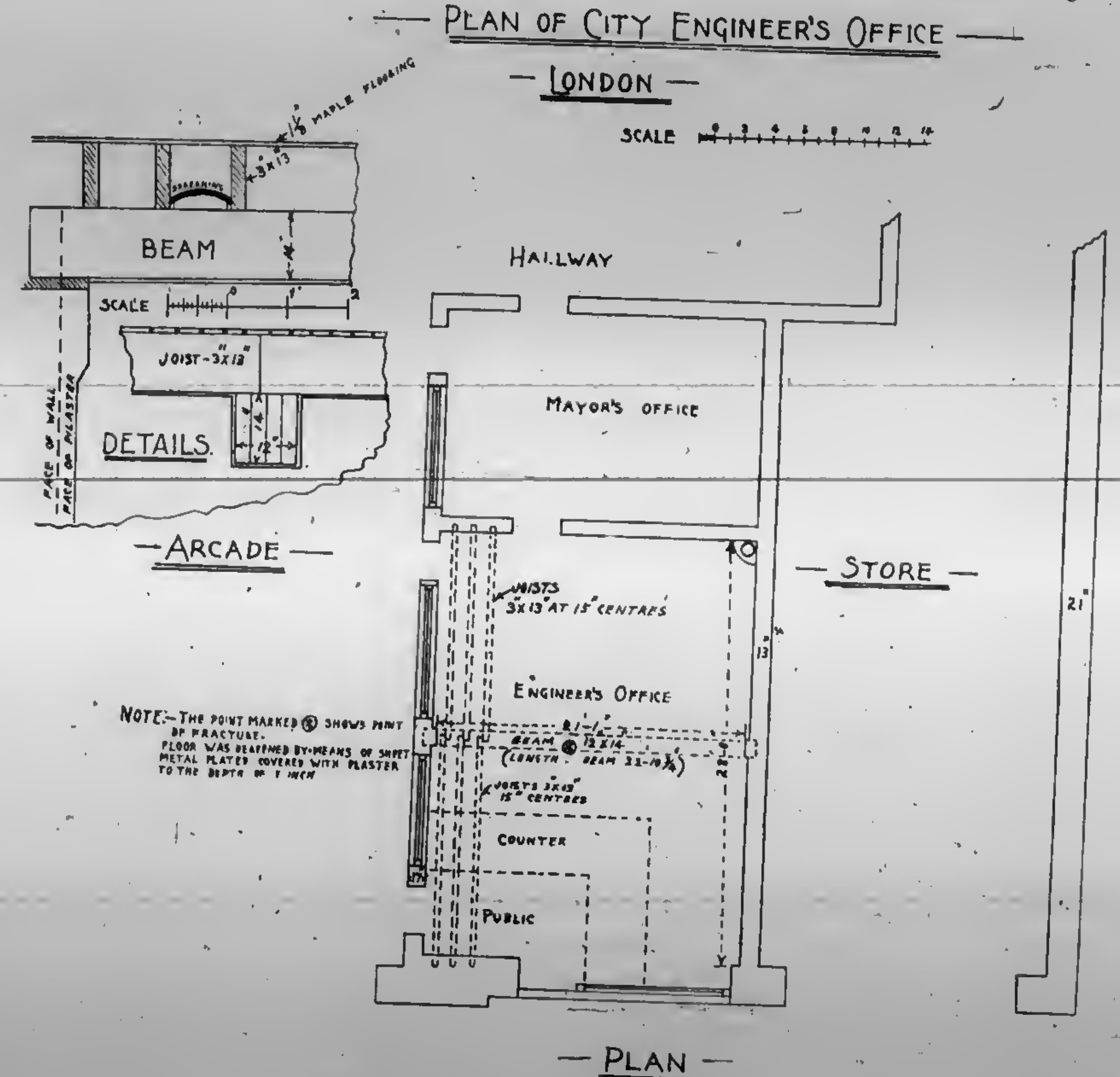
QUESTIONS AND ANSWERS.

MR. Walter Alford, Belleville, Ont., writes: "Kindly inform me what is the safe weight of a floor composed of white pine joists, 2″ × 10″, 17′ long, set 12″ centers having one row of bridging, and covered with 1¼″ matched flooring? What would be the breaking weight? What margin of safety is necessary over the safe weight for public buildings, &c."



DETAIL—TORONTO UNIVERSITY.

ANSWER.—A floor composed of 2″ × 10″ joists placed at 12″ centers and having a span of 17′, would carry safely, with a factor of safety of 3, 111 lbs. per square foot. The floor of a public hall should be made to carry 125 pounds per square foot, including the weight of the materials in the floor, and the factor of safety should not be less than 4, and in some instances 5. You should make your joists at least 2″ × 12″, when your floor would carry, with a factor of safety of 3, 159 lbs. per square foot, or with a factor of safety of 4, 119½ lbs. per square foot.



THE LONDON BUILDING DISASTER.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE usual winter course of lectures of the above association will be held in the Art Gallery, Phillips Square, Montreal, as follows:—January 27th, at 8.15 p.m., "Pompeii: A City of the First Century," with illustrations, by Prof. Frank D. Adams, M. A., Sc., Ph. D. February 24th, at 8.15 p.m., "Brunelleschi," with illustrations, by Prof. C. W. Colby, M. A., Ph. D. March 29th, at 8.15 p.m., "Ancient Rome," with illustrations, by Prof. S. H. Capper, M. A.

Through the influence of Mr. A. T. Taylor, Hon. Secretary R. I. B. A. O., the Province of Quebec Association of Architects has received the documents, models, programmes, etc., for the international competition for the Phoebe Hearst architectural plan of the University of California. These documents, etc., are exhibited in the rooms of the association, New York Life Building. Architects have been invited to call and inform themselves on this important matter.

THE BUILDERS' EXCHANGE.

SOME particulars were given in the ARCHITECT AND BUILDER for December of the preliminary steps taken in the direction of organizing a Builders' Exchange for the city of Montreal. It is gratifying to state that the organization of the Exchange has now been accomplished. The officers elected are as follows: President, James Simpson; vice-president, C. T. Williams; hon. secretary-treasurer, G. J. Sheppard; board of directors, Messrs. James Simpson, P. Lyall, A. Cowan, J. McLean, F. Fournier, C. T. Williams and W. P. Scott.

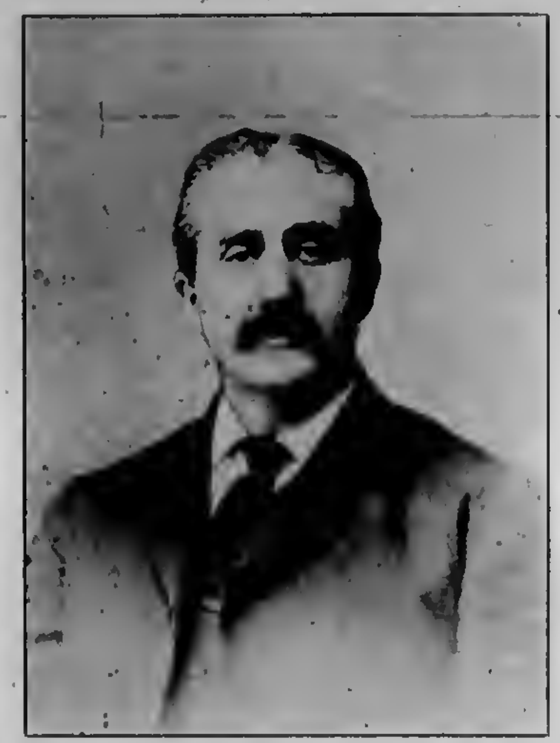
The directors have rented and had fitted up to suit the requirements of the Exchange a suite of rooms in the Mechanics' Institute Buildings. From 10 to 12 o'clock has been selected as 'Change hours, when members or their representatives will be in attendance to meet those desirous of doing business with them.

A great deal of interest and enthusiasm has been awakened in the movement, the success of which appears to be, to a large extent, already assured. The management has been placed in competent hands, and there is reason to hope that the Exchange will rapidly grow in membership and influence.

MR. JAMES SIMPSON,
President Montreal Builders' Exchange.

Printed herewith are brief sketches and portraits of the president, vice-president and hon. secretary-treasurer, upon whose energy and ability the prosperity of the new organization must largely depend.

Mr. James Simpson, first President of the Montreal Builders' Exchange, is senior member of the firm of Simpson & Peel, carpenter contractors. He is a native of Montreal, and to the manner born, having succeeded to the business of his father, the late James Simpson, Sr., who was its founder half a century ago. That Mr. Simpson is a thorough master of his trade is evidenced by the creditable work performed under his direction in such buildings as the New York Life Building, on Place d'Armes, the Imperial Building on St. James street, the Bank of Toronto Building, the Royal Victoria Hospital and many handsome residences.



MR. C. T. WILLIAMS,
Vice-President Montreal Builders' Exchange.

Mr. Charles T. Williams, Vice-President of the Builders' Exchange, was born in New England in the year 1845 and had his early business training in the near neighborhood of Boston. Coming to Canada in the spring of 1874, he formed the acquaintance of Mr. Geo. W. Reed, the well known roofer of that city, with whom he soon became associated in business. For several years past he has had the entire management of the business, and in January, 1897, bought out Mr. Reed's interests and assumed the entire control, but retaining the firm name of George W. Reed & Co. The house has a large business in roofing and roofing materials, asphalting, galvanized iron piping, &c., and has lately added the agency for the Boston Blower Co., heating and ventilating engineers, to the lines formerly carried. Excellent examples of artistic workmanship in copper carried out under Mr. Williams direction, may be seen by examining the roof of the McDonald and Redpath Buildings at McGill University and the residence of Mr. Duncan McIntyre.

MR. GEO. J. SHEPPARD,
Secretary-Treasurer Montreal Builders' Exchange.

Mr. George J. Sheppard, who was by an unanimous vote elected to the position of Hon. Secretary-Treasurer, has been largely instrumental in getting the Builders' Exchange started. He has for some years been connected with his father, Mr. Charles Sheppard, in the brick and tile manufacturing business. Founded upwards of 39 years ago, the business has grown and developed to a remarkable degree. The extensive plant and works are located at the head of DeLorimer, Parthenais and Fullmor streets, and comprise seventy acres of land. The equipment is modern in every respect. An idea may be gained of the large capacity of these works when it is estimated that their aggregate output has been over 300,000,000 of bricks in the city of Montreal. Mr. George J. Sheppard is well and favorably known in Montreal and vicinity, where he is regarded as one of the rising and promising commercial men.

DETAIL—TORONTO UNIVERSITY.

THE AMERICAN TALL BUILDING.

Some Notes in Criticism by Professor S. H. Capper.

[IN our October issue we gave an abstract of the paper read by Prof. Capper, of McGill University, at the session of the Province of Quebec Association of Architects; the following is the full text of the greater part of that paper, which Prof. Capper has kindly revised for publication in the CANADIAN ARCHITECT AND BUILDER.]

Probably to most of those who are sufficiently interested in architecture to take heed of contemporary work, the "tall buildings" of New York and other cities embody America's chief contribution to modern architectural advance. They have led to new and complicated problems of construction, solved, doubtless, with all the energy, the boldness, and the address characteristic of American engineering. They also present esthetic problems of considerable importance and interest, the solution of which is, perhaps, not so apparently ready or convincing. At any rate in New York itself, where these "tall buildings" are already numerous, the divergence of design, not merely of ornamental detail, but of radical conception as a whole, is very marked. All is tentative, and all (one might almost add) attempted; for much is extravagant, tried (it would seem) if haply the result may justify the trial with a success which sometimes aims at rather the clamour of advertisement than the excellence of studied and achieved design.

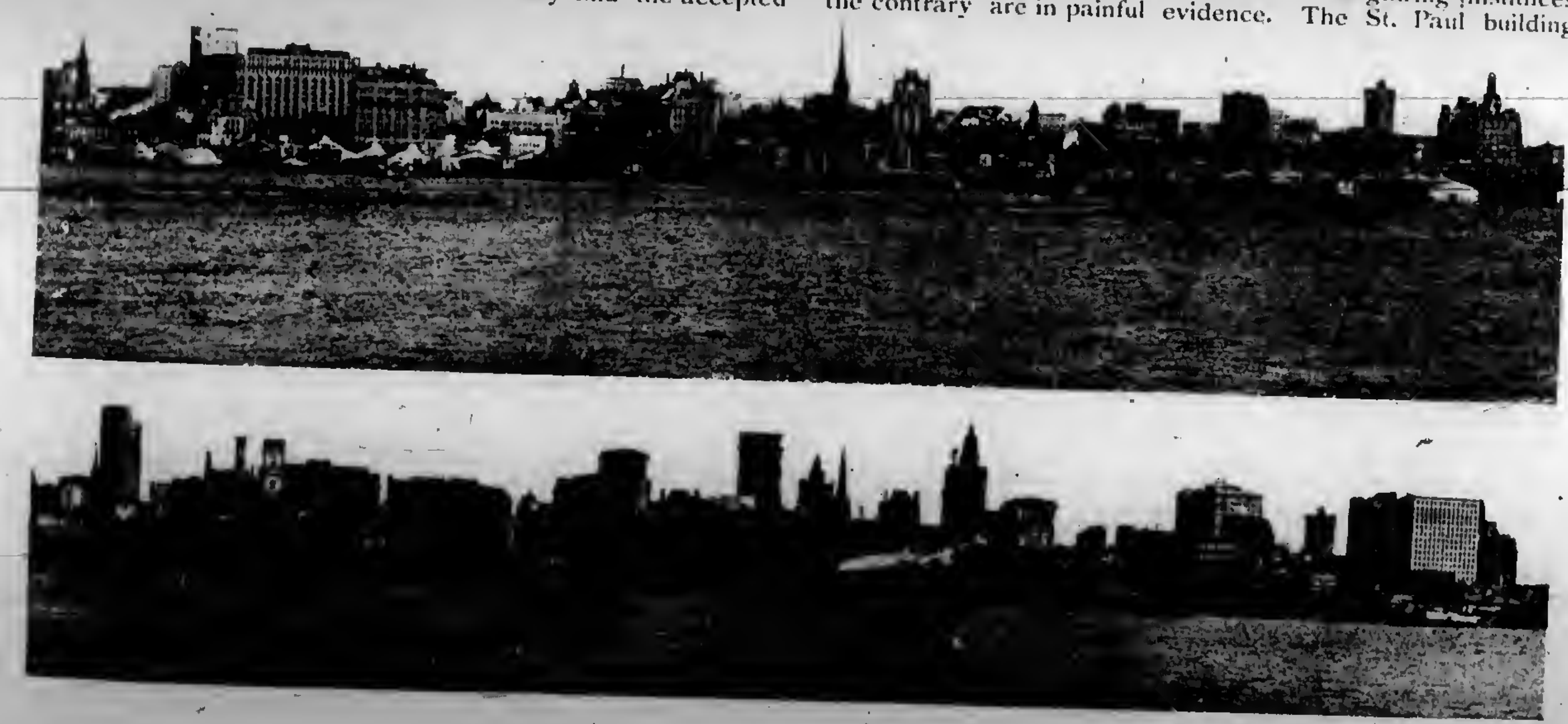
The problem asking for solution is an eminently modern one. Architecture cannot, on pain of proving untrue to her traditions as a living art, refuse to entertain it, to grapple with it, and eventually to reach a satisfactory solution. We must, I hold, put definitely aside the criticism so often heard: "These tall monstrosities are not architecture at all; they are only engineering, with a stone veneer." They are buildings of our modern city streets; and if these be not architecture, where indeed is modern architecture to find her place? She is bound to find her own solutions for novel problems, however difficult, and to achieve a harmony between the requirements of to-day and the accepted canons of artistic sense. It is essentially in responding to the needs of modern complex life, in interpreting and meeting them, that the art itself is modern and living.

The problem is undoubtedly difficult. As usual, it reaches the architect in a somewhat advanced and complicated stage; he has to grapple with it with many data already definitely fixed and binding his design. On a restricted site of enormous initial cost, a building has to be erected of sufficient cubic capacity to "pay." It is the heavy cost of building sites to which is usually ascribed the necessity for these tall buildings. But in an able "rejoinder" Prof. Hamlin has pointed out that the special reason for their prevalence in America and their absence from European cities is rather to be found in the fact that "the 'sky-scraper' is a huge labor-saving and time-saving device"; their origin, therefore, is to be "sought in the drive and hurry of American business life, and in the accompanying American propensity to save time and labor."

Whether the financial problem or this American need for concentration be the determining factor, extension by way of height is the solution practically arrived at in these "tall buildings." Excessive height, however, creates at once constructive difficulties. These are being met and satisfactorily disposed of by the many expert engineers who have so brilliantly worked out the various novel methods embodied in the construction of the tall buildings. New methods of foundation have been evolved, apart from which the main factor in construction is the steel-skeleton structure. The requirements of floor space (dictated by financial needs) rigidly limit the supporting and enclosing walls to the least superficial area compatible with safety and stability. Further, the need for the maximum of light in the interior equally leads to the reduction of wall thickness and external piers, while it forces the engineer to find a substitute for the ordinary diagonal bracing and cross-ties, which are incompatible with windows. With these complicated restrictions, the architect has to design his building, fettered and hampered, or, on the other hand, inspired, it may be—for restriction is ever a fertile cause of happy ingenuity and an occasion for success. Moreover, be it remembered, the architect has here artistic opportunity in height before undreamed of, and quite beyond his reach without the steel-framed structure, which is the essence of his building.

In the first place, the buildings have the very great advantage of being isolated above street level. They can, therefore, be designed, as complete in themselves, in a way that no ordinary street building permits. But they are seen all round, and must be designed as a building in three dimensions, not as a mere street front. In spite of this self-evident fact some glaring instances to the contrary are in painful evidence. The St. Paul building in Broadway at present is so indescribably maimed in this respect that it can, presumably, be but partially complete. As it stands, a more striking instance hardly could be found of designing a front without looking round the corner, in this case the neglected "round the corner" being considerably more in evidence than the columned stories of the front itself. But any possible design would have been irretrievably ruined by the utter hopelessness of this site in shape and superficial area.

This isolation is, of course, a permanent advantage, for the



LOWER NEW YORK, AS SEEN FROM THE HUDSON RIVER.
The upper view was taken about 1891, while Trinity Church Spire was still the culminating point of the sky line. The lower view was taken in the spring of 1897, and shows the church engulfed in the surrounding high buildings

buildings, to achieve their object, must remain isolated and apart; if crowded up, their lower storeys become correspondingly reduced in value. It is said that this is an economic factor that has already made itself felt; and it is quite conceivable that in self-defence the tall buildings will surround themselves with shorter neighbors, or, in other words, will come to be designed as only the central portions of a larger, lower block. If so, their design will be a good deal modified, probably in marked improvement. At present the lower stories are said to be in little demand, and, as the streets, which are darkened by these buildings, are generally too narrow, it is possible that an expedient may be found corresponding somewhat to the arcaded streets of old Bologna, some portion of the ground space being given in compensation to the darkened streets, to the no small gain of the jostled foot-passenger. This would not necessarily cause the buildings to appear propped up on stilts; it would be more likely to add to the importance of the lowest storey by the pillared complexity introduced.

In the second place, where so great height is *de facto* attained, it seems unnecessary unduly to emphasize it in exterior design. A good many of the buildings are designed on the principle of strongly vertical lines carried through many storeys. This I venture to deem in some measure a mistake. It is right for a comparatively slender tower, undoubtedly, where the sole object is height; every one will recall the noble campanile of St. Mark's at Venice (in the lower and comparatively early portion), as well as many others. These tall buildings, however, in spite of their tallness, are by no means towers; they are spacious and habitable buildings; to design them as towers is a twofold mistake, both practical and esthetic; it is their

ST. PAUL'S, LONDON.

openness, their brilliant lighting, their spaciousness, that should be emphasized, and that can best be done by horizontal treatment of the storeys. Moreover, such a treatment would be, perhaps, more in accord with their construction. It is one of the misfortunes of their steel-skeleton construction that it must all be, perforce, concealed. The material, unless buried in a fire and weather-resisting shell, is extremely ephemeral and unenduring. Consequently, the architect lacks that guidance of dominant construction which goes so far to make a design coherent, logical, and easy to interpret. Yet it is a fact that these great buildings are erected in horizontal stages, comprising, it may be, several storeys each, but still well-defined platforms, or stages. And these should surely be seized upon, if practicable, and interpreted in the exterior design. It seems to me that in this way the buildings would very greatly gain in meaning and expression.

A word or two may here be suggested in regard to this construction from the esthetic point of view. Since the Gothic revival, with its battle-cry of "ornamented construction" and its decry of "constructed ornament," it is natural and inevitable, and surely right, to seize first on genuine construction to be interpreted and expressed in a design. Where, then, is there room for this totally concealed construction? Some would, of course, deny *in toto* its right architecturally to exist; metal cased in stone, they claim, is a quite illegitimate method of architectural construction, being a sham of the most flagrant kind. To deny, however, to iron and steel the position they have conquered in the world of modern construction is, of course, wholly futile. But from their perishable nature they must be hidden away for their own protection. How, then, are they to be dealt with? The most obvious method is to case the metal in some form of plastic material, such as terra-cotta; steel construction, thus treated, is quite capable of honesty above reproach. Whether stone is a wholly legitimate substitute for a plastic material thus required to case it in is a good deal more open to question. It is certainly more costly and more difficult to handle; above all, it is a less natural material when so used. We are all so thoroughly accustomed to stone, "solid stone," as a material for the most durable, the most massive, and the most solidly constructed buildings, that it is certainly a shock to see it cramped on to a steel backing, treated like a veneer, pared down and pinned and bolted into place. This is certainly not material used in its natural way; it is so unnatural, and shocks so irretrievably, that I very much doubt if it can be accepted esthetically as so satisfactory as a wholly plastic material. On the other hand, it may be legitimately contended that with stone one can get both color and texture, which are not to be had in any terra cotta or similar material. These are the two sides of a controversy upon which dogmatic decision is, perhaps, impossible.

In the third place, much and lavish exterior ornament seems wholly out of place. The buildings are themselves so large and so imposing that they do not require enrichment to give them interest; mere surface ornament becomes unmeaning and superfluous; when used on so large a building it becomes mere frittered labor, painful from its ineffectiveness. Many of the "tall buildings" of New York are rather lavishly ornamented, but the ornamentation is ultimately felt to detract from, not to enhance, their size. The truth is that, in a very large building, an almost monotonous repetition is of potent artistic value. Of this the Flavian Amphitheatre at Rome, the so-called Colosseum, is a well-known instance. The steady repetition of the same architectural motive, in an apparently endless series of arcades with engaged columns between, impresses the beholder with an irresistible majesty. It is true that here the individual features are themselves of large, even colossal, scale; but something of the same effect seems not wholly unattainable in these tall buildings, with their monotonous repetition of similar window openings. In the "lands" of the historic High street of Edinburgh are a good many instances of distinct architectural value and impressiveness depending wholly on sheer repetition of ordinary window openings, storey above storey. It is noteworthy, moreover, that these comparatively "tall buildings" of old Edinburgh, somewhat famous in their way, are totally devoid of architectural ornament, though singularly effective in the fair city architecture of the "Modern Athens."

In the enormously larger "tall buildings" of American cities, superfluous ornamentation tends rather to disturb the resulting impression of solidity and power and scale. The most recent type of the "tall building" in New York seems to relegate the ornamentation to the base storeys just above the street, and to the top, or crowning, storeys. As has been mentioned, the lower storeys are said to be of inferior letting value, and are not, therefore, very naturally selected for extra cost in execution. But probably the temptation to enrich the storeys within fair reach of the eye from the street-level is strong, and artistically is defensible. Above all, the main entrance naturally calls for emphasis and enrichment; one does not expect to enter so imposing a building by any mean or insignificant doorway. The cornice is a great difficulty; it has not, it seems to me, as yet been adequately studied out. In so huge a block of building it should have a projection unattainable in practice. In Florence the Strozzi Palace (though only a portion of the grand cornice has ever been completed) is a very fine example of a simple cliff-like facade crowned by a rich and noble cornice. In Rome one turns naturally to the grand cornice of the

Farnese Palace, in competition for which Michael Angelo waxed so mightily indignant. Both these are classical examples, to which might be added, in more recent times, the Arc de Triomphe at Paris. But beyond this limit it is not possible to go in stone. What, then, are the designers of those "tall buildings" to do? The course generally adopted has been to use metal in place of stone; but the result is necessarily either fraudulent, in so far as the change from stone to metal remains undetected, or hybrid, as a patchwork of materials; neither alternative is satisfactory. I venture to suggest that it is preferable to abandon the attempt (which must be futile) to obtain exaggerated overhang, and to substitute therefor vertical depth; by restudying the cornice in this sense, including a storey or more in the depth of the cornice and its members, I believe a more satisfactory and a wholly legitimate result would be obtained. For this, too, we have an eminently successful classical example. The famous cornice of Vignola, with its deep consoles, will be readily recalled. Vignola, on a small scale, had the same problem to solve, and he solved it most judiciously by increasing his cornice in vertical depth without exaggerating the overhang. Modifications of this cornice are constantly used in modern French street architecture with happy effect; and, if a leaf were taken from the old Italian's book, though not without much study, there could doubtless be evolved a more suitable cornice for a "tall building" than by flying to metal and treating us to gilded gingerbread and tinsel two hundred and fifty feet above our heads.

It remains to add a word in regard to the effect of these "tall buildings" upon the appearance of the city as a whole. So long as they are few in number, they are said to have given New York a very ragged sky-line, unkempt, so to speak, and unpleasing.

ELECTRIC LIGHT PLANT, FORESTERS' TEMPLE, TORONTO.—VIEW OF GENERATORS.

Now that they are fairly numerous, this seems no longer the case. The general raising of height—a result of modern city development by no means confined to New York—has necessarily tended to submerge many a worthy building that formerly rose tall and stately above its surroundings. An extreme case is Trinity Church, New York, a very sober and quiet study in perpendicular Gothic, the graceful spire of which formerly rose clear, a notable landmark of the city. It is now completely submerged and lost, rising, as it were, in slender effort, stifled in a sort of well. But this is painfully true of other cities, too. All visitors to Paris know how the Church of the Madeleine is now felt to be too low for its surroundings; how much it would gain by being raised above the houses that hem it in! In London, also, many of Wren's fine steeples are now almost equally engulfed and lost.

Nothing can excel the noble approach to New York; it is undoubtedly one of the fine harbors of the world. But the city itself is totally destitute of "heights." This lack the modern "tall buildings" certainly go some way effectively to make good, and I cannot but feel sure that in sky-line and general appearance from the harbor New York has gained from them.

That such would be the case elsewhere is not so certain; New York, from its original flatness, is perhaps a special case. It is comparativety easy to dwarf nature; and one of these tall buildings, judiciously planted so as to spoil a natural landmark, could achieve without difficulty total and fatal ruination of a noble scene. It is dreadful, for instance, to imagine the Acropolis of Athens girt around with buildings like those in Broadway. Imagine Siena, her valleys enriched with "tall buildings" sprouting high above that fair Duomo which so nobly crowns her highest rock! Imagine Florence, nestling by the Arno under the heights of Fiesole and the distant girding Apennines,—imagine Florence, now so fair, sleeping under Giotto's campanile and Brunelleschi's dome, were she to awake and find her Duomo dwarfed and thrown into the shade by a ring of New York tall buildings of the latest type, or of Chicago sky-scrapers! Wren's noble dome, though somewhat dwarfed in height by its modern surroundings, nevertheless still floats in fair serenity, majestically crowning murky London. I cannot think that "tall buildings" are actually wanted in any of these cities; sufficient unto America be the "tall buildings" thereof.

THE ELECTRIC LIGHTING PLANT, TEMPLE BUILDING, TORONTO.

OUR readers, especially architects, will no doubt be interested in the accompanying illustration and partiulars of the plant which has recently been installed for the purpose of lighting with electricity the newly completed Temple Building at the corner of Richmond and Bay streets, Toronto.

The room containing the generating apparatus is 50 × 32 feet in size. The contract for engines and electric generators was carried out by the W. A. Johnston Electric Co., of Toronto. Three direct-current 50-kilowatt Walker generators, for which the above company are Canadian representatives, are direct-connected to "Ideal" engines, 12 x 12, the latter manufactured by the Goldie & McCulloch Company, of Galt. One of these generators is wound for 250 volts, is running at 275 revolutions per minute, and is supplying current for motors and electric elevators. The motors drive the fans for ventilating purposes, and will also be required for other power service. The other two generators are wound for 125 volts, and are furnishing current for electric lighting throughout the building, which is wired for a capacity of 2,800 16 c.p. lights. In addition to these generators there is a motor generator of 80 lights capacity, built at the works of the W. A. Johnston Electric Co. This machine takes current from the power generator and supplies lighting during the day-time. This portion of the installation has many points of merit, the three direct-connected generators only occupying a space of about 12 by 33 feet. The economy in space by means of the direct-connected generators is a great consideration in plants of this character. The running of the engines and dynamos is practically noiseless. They are also perfectly dry, and persons can place their hands on any part without feeling the least current. This plant is said to be of larger capacity than any isolated plant yet installed in Canada.

Mr. Thomas Weston, Secretary-Treasurer of the Hamilton Bridge Co., died last week at his residence in Hamilton, aged 44 years.

The Mackey Stained Glass Co., Toronto, have recently published a catalogue, showing designs for ornamental glass for a variety of purposes, and prices.

The National Supply Co. have succeeded to the building supply business formerly carried on by Mr. E. D. Morris, and have erected commodious premises at No. 1111 Yonge street, Toronto.

At the late municipal elections, Mr. Bowman, the popular representative of the Don Valley Pressed Brick Co., was elected as alderman for the sixth ward, receiving the largest number of votes of any of the candidates.

ONTARIO ASSOCIATION OF ARCHITECTS.

Proceedings of the Tenth Convention.

THE tenth Convention of the Ontario Association of Architects was held at the School of Practical Science, Toronto, on Tuesday and Wednesday, the 11th and 12th of January, the President, Mr. J. W. Power, of Kingston, Ont., in the chair.

The minutes of the last annual meeting having been read and confirmed, the President's address, which elicited hearty applause, was read as follows:

PRESIDENT'S ADDRESS.

GENTLEMEN:—As President of the Ontario Association of Architects it affords me great pleasure to welcome you to this, the seventh annual convention of this association since incorporation, and wish you a prosperous new year. During the year my great inability to fill the office of President as it should be and has been by those who have held the position before, has been very forcibly impressed upon me. I can but feebly express my appreciation of the honor conferred upon me by electing me to the position which I occupy to-day as President of this Association. Living, as I do, outside the city of Toronto, I have been in some respects greatly handicapped, and in this connection I would offer my thanks to the Toronto members of the council for the efficient transaction of so much of the business.

I am sorry to have to record the loss by death of one of our oldest members and a former member of council—I refer to the late F. J. Rastrick, of Hamilton, Ont.

It is not my intention to weary you with a review of architectural progress during the year, especially in view of the continuance of the hard times of the past three years and the slight foundation at present existing upon which to build our hope of improvement. The pages of the CANADIAN ARCHITECT AND BUILDER and other architectural and engineering journals have no doubt kept you informed regarding works of any importance.

As to the proposed amendment to our act, we have but little new to report since our last convention. We will no doubt have a report from the Legislative Committee, but as a connecting link, I might state that at the time we were before the Bills Committee we had hopes that they might recommend that the question of examinations be taken up by the House as a government measure. If this recommendation has not been made—and I very much doubt if it has—I feel that we could very properly, after trying for nearly eight years to work and educate our students under an unworkable act, petition the Minister of Education to take up and carry on this portion of the work in connection with the School of Practical Science, and establish a professional degree, along the same lines as the professional degrees in engineering.

I would further strongly advise this convention to take up the scheme laid before us at the last convention by our then president Mr. H. B. Gordon, as to the grading of members, on the lines of the Royal Institute of British Architects. I will now read his remarks and proposals on this subject, but before doing so, let us dwell for a few moments on the subject of education, and go back to the days of Vitruvius. Writing on the subject of architecture and architects, he says of the former that "practice and theory are its parents. Practice is the frequent and continual contemplation of the mode of executing any given work, or of the mere operation of the hands for the conversion of the material in the best and readiest way. Theory is the result of that reasoning which demonstrates and explains that the material wrought has been so converted as to answer the end proposed. Therefore the mere practical architect is not able to assign sufficient reasons for the forms which he adopts, and the theoretical architect also fails, grasping the shadow instead of the substance. He who is theoretical as well as practical is therefore double armed—able not only to prove the propriety of his design, but equally so, to carry it into execution. A student should be apt and ingenius in the acquisition of knowledge; deficient in either of these qualities he cannot be a perfect master. He should be a good writer, a skilled draughtsman, versed in geometry and optics, expert at figures, acquainted with history, informed on the principles of natural and moral philosophy, somewhat of a musician, not ignorant of the science of law and physics, nor of the motions, laws and relations to each other of the heavenly bodies. By means of the first-named acquirement he is to commit to writing his observation and experience in order to assist his memory. Drawing is employed in representing his designs. Theory is common to and known to all, but the result of practice occurs to the artist in his own art only. Practice also can lead to excellence in any one art: That architect therefore is sufficiently educated whose general knowledge enables him to give his opinion on any branch when required to do so."

It is manifest that since the days of Vitruvius both the knowledge required and the functions to be discharged by an architect have enormously increased in volume and complexity. To realize this, one has only to glance, among other things, at the many styles which have arisen and had their vogue since Vitruvius' day, with all of which some acquaintance is supposed to be necessary for the development of modern methods of construction, sanitation, decoration and what not. To put it shortly, a young man having acquired the knowledge implied by the passing of an examination such as we have been considering will have a well laid foundation for his training, but the superstructure must be built up by practical experience under others. All this is in keeping with our act, and if the examinations were conducted by the Department of Education through the School of Practical Science, the degrees and all the conditions would be precisely similar to those laid down by the School for the establishment of the following degrees, namely, Civil Engineer, Mining Engineer, Mechanical Engineer and Electrical Engineer. Furthermore, the School is thoroughly equipped in every particular. The staff is beyond question, the apparatus and machinery are of the best, and the library by all odds the best in the Dominion, excepting only the Parliamentary library at Ottawa, and that for this particular branch may be also inferior. Under such conditions the taking over of these examinations would be a boon alike to the Public, the Profession and the School.

Mr. Gordon's scheme is outlined by him in these words:

"Meantime we might consider whether the gaining of some present title of distinction indicating educational standing and proved architectural ability, might not be a desirable stimulus to those in the Association. In the Royal Institute of British Architects there are three grades of membership, namely, Fellows, Associates and Honorary members. The first two (except in special cases) have to pass examinations before they are privileged to use the title of distinction. Thus the affix of A.R.I.B.A. means something to a British architect and gives him a definite standing before the public. Possibly it might be well for us to make a distinction in our membership. For instance, it seems but reasonable that those young men who have passed the Association's examinations should be placed on a higher level than those who have come in merely because in some manner or other they have been practising architecture at the time of legislative action. It is also evident that young men who have only recently passed their examinations should not be placed in a higher grade than older men who have spent a score or more years in the honorable practice of their profession, and whose works are a testimony of their ability. The inauguration of any system of degrees is beset by difficulties, but if the general idea met with approval, no doubt some practical method of arranging the matter will be suggested. It might be possible to have the ordinary members designated by a simple O.A.A. Those who have passed the examinations and thus become graduates, distinguished by G.O.A.A., while the older men, whose work and position in the profession justifies the honor, might by a recommendation of the council and vote of the conventinn, be elected to the position of Fellow, with the right to add F.O.A.A. to their names. I would suggest that it be referred to a committee or the council for consideration and report, to be presented here tomorrow."

As Mr. Gordon points out it is but fair that those young men who have lately passed and are now studying, together with those who have worked hard for nearly nine years, devoting their time and money in trying to educate students and raise the standard of the profession, should get some recognition. The distinction may not be recognized by the general public, but it is gratifying to know that it is a fact nevertheless, as is attested by the frequent letters asking for information—the last that came under my notice being dated Dec. 14th, from one of the Library Committee of the Underwriters' Association at San Francisco, asking for a copy of Mr. Burke's paper on slow burning construction, which the writer had heard of as a most valuable contribution to the subject. I mention this as but one of many instances that go to show that we are making headway—slowly you may say—but, neverthless, surely.

Take for instance the class of buildings going up to-day in many of our towns and cities (by this I mean buildings of similar size, height and cost) and compare them with those of but eight years ago. The difference is quite evident to the ordinary eye, not to mention the vast improvement in detail, sanitary matters and construction. I would here suggest that the circular letter of the Committee on Building By-laws, have this or some similar request added: "that it be read before the Council or other body to whom it may be addressed," for there are buildings erected and others in course of construction which many of us know are not as they should be, and while not perhaps dangerous, are fast becoming so, and from other causes than decay. If copies of the circular were sent out now, just after the terrible London disaster, they might help to open the eyes of the public to the grave responsibility resting upon municipal bodies and officials.

We are often struck with the absurdity of some of the remarks made at meetings of some of the Boards of Health, as to causes, complaints and remedies in such cases. The standing committee on building by-laws or city improvement might consider the advisability of suggesting the class of available men for such boards, as in some cases the choice seemingly gets little consideration.

I am very much pleased to hear of the great success and good work being done by the local or Toronto Chapter of this Association, and can only hope that it way continue.

You will see by the agenda that the time usually devoted to paper reading will on this occasion be taken up by practical talks. We may consider ourselves particularly fortunate this year in having so many subjects of importance brought before us by practical men; I trust the discussion may be full and all the points brought out.

We are all pleased, I am sure, to see the marked headway which the Province of Quebec Association is making, and the vigorous steps taken in its interest by the Council. The State of Illinois is also to be congratulated on the admirable bill they have been granted by General Assembly.

Many of us no doubt have read the discussion which a short time since was going on in Montreal, as to the strength or carrying capacity of an 8½ inch porous terra cotta wall, which was eventually taken to the courts and there decided. The judgment I think from actual facts might not have resulted the same. We in this province are in much the same dilemna for the want of a standard test of these materials. It might be wise for this convention to consider the advisability of asking the government to make an official test of our Canadian materials—stone, timber, cements, &c. Such tests could be conducted by the School of Practical Science and a co-operating committee of this Association. One of the best works done by this Association was the publication, a few years ago, of tests of Canadian building stones, the only trouble being that they did not go far enough.

The Treasurer, Mr. Edmund Burke, then read his report of the finances of the Association for the year, which, on motion by Mr. Siddall, seconded by Mr. Gregg, was received and adopted.

THE TREASURER IN ACCOUNT WITH THE ONTARIO ASSOCIATION OF ARCHITECTS.

1897.	Dr.	
Jan. 1.	To balance from 1896	$1,276 43
Dec. 31.	Members' annual fees	112 00
	Members' registration fees	15 00
	Students' registration fees	17 00
	Students' examination fees	5 00
	Sale of examination papers	25
	Library fines	20
	Interest on Treasurers' bank account	38 90
		$1,464 78
1897.	Cr.	
Dec. 31.	By W. A. Langton, salary for the year	$300 00
	W. A. Langton, general disbursements	15 04
	Printing reports, circulars, etc.	52 81
	C. H. Mortimer, subscription for CANADIAN ARCHITECT for 1897, sent to three British and one American Architectural Association	9 50
	C. H. Mortimer, reporting Convention	12 50
	Harry Webb, Convention lunch	14 00
	Caretaker School Practical Science, re Convention	5 00
	Refund, one examination fee	1 00
	Books added to Library	4 00
	Jos. W. Power, expenses in connection with Legislation and Council meetings	29 15
	Total disbursements	$ 443 00
	Balance on hand	1,021 78
		$1,464 78

We have examined the books, vouchers, etc., of the Association, and certify that the above is a correct statement thereof.

(Signed)

HENRY LANGLEY } Auditors.
WM. R. GREGG }

The Treasurer, in submitting the accompanying statement, begs to report that all the outstanding accounts for the year have been paid. The expenditure ($443.00) is $130.32 less than last year, which was $573.32, after deducting $165 which should have been paid in 1895. The receipts, including bank interest, are $181.60 less than last year. There has been a serious falling off in the payment of members' annual fees, being $159.00 less than 1896. The amount received for fees for 1897 is only $31.00. It is obvious that, unless this condition of things is remedied, the Association will in a very few years be unable to meet its current expenses. Our balance in the bank last year was $368.37 less than in 1895, while this year it is $254.65 less than in 1896. At this rate of decrease the Association will be without funds in less than four years.

Respectfully submitted,

EDMUND BURKE, Treasurer.

The registrar then read the following report, which, on motion of Mr. Gray, seconded by Mr. Gregg, was received and adopted:

REPORT OF REGISTRAR AND LIBRARIAN AT THE ANNUAL MEETING ON JANUARY 11TH, 1898.

MEMBERS.—The number of members on the roll is 132, the same as in the previous year; there being one death, but also one registration.

STUDENTS.—There have been three students registered. The examinations were held in March. The Board of Examiners was the same as in 1896, viz., Prof. Galbraith (Chairman), Messrs. C. H. C. Wright, M. B. Aylsworth, R. J. Edwards, W. R. Gregg, Grant Helliwell, W. L. Symons, S. H. Townsend and A. F. Wickson. There were two students examined: one for the First Examination, who passed, after a supplemental examination; and one for the Second Examination, who was plucked.

LEGISLATION.—The Bill to amend the Act of Incorporation was introduced again in the Legislature, and was referred to a special committee composed of the same persons who had constituted the special committee to which the Bill was referred in the previous year. On this occasion the Bill was supported by a well-signed petition which had been circulated throughout the province by the Legislation Committee, and also by letters from prominent builders in the country, and by a resolution of the Federated Council of the Building Trades of Toronto. The Trades and Labor Council appeared before the committee to oppose the Bill, but withdrew their opposition on learning that the Association had no desire to control the examination of students. The Bill was opposed by counsel representing two architects; one a member of the Association, whose objection was said to be that there would be an undue increase in the number of architects if the Bill were to pass; the other, not a member of the Association, who objected that he would be compelled to pay an annual fee to continue a right which he already possesses, that of calling himself an architect. The special committee showed a hostile majority unchanged in opinion from the previous year, and it was necessary to withdraw the Bill again, and, as regards this Parliament at least, finally.

LOCAL CHAPTER.—Pursuant to the Chapter by-law passed at the last annual meeting of the Association, a local chapter was formed by members of the Association in Toronto.

THE LIBRARY.—Kidder's Building Construction and Superintendence, Vol. I., has been added to the library. There have been 52 lendings.

The Secretary also read read the report of the Local Chapter, which was as follows:

REPORT OF TORONTO CHAPTER.

TORONTO, January 10th, 1897.

Pursuant to motions made at meetings of Toronto architects held in the office of W. A. Langton on Dec. 9th and 30th, 1896, also Jan. 19th, 1897, and with authority obtained from the Ontario Association of Architects at the annual convention held on Jan. 12th, 1897, a Toronto Chapter of the said O.A.A. was formed and held its first monthly meeting in School of Practical Science on Feb. 8th, 1897, with an executive committee, composed of Mr. W. R. Gregg, chairman; A. F. Wickson, vice-chairman; J. W. Gray, F. S. Baker, G. W. King, and Henry Simpson, secretary-treasurer.

The names of twenty-eight city architects are enrolled as regular members of the Chapter.

At the regular monthly meetings the following papers were read: Feb. 8th, 1897—"Sunday School Planning," by A. F. Wickson; "Objects of the Chapter," by W. R. Gregg. March 8th—"Modern Methods of Electric Wiring," by H. T. Strickland; "Stereoptican Exhibition of Architectural Views," by Mr. Keele. April 12th—"Contracts," by R. J. Edwards. Nov. 8th—"The Nature of Architectural design," by W. A. Langton. Dec. 13th—"Pneumatic Foundations," by H. T. Laing; "Foundations," by A. F. Wickson.

HENRY SIMPSON, Sec.-Treas.

Mr. Gregg thought that the constitution drawn up for the Toronto Chapter might be found of service to those desiring to institute Chapters in other places if printed so as to be available for this purpose, and in moving that the report be received and adopted would make this suggestion. The report was received and adopted.

Mr. Siddall asked if it was not intended that there should be a report from the Committee on Degrees?

The Registrar stated that the Council had desired him to report that they had not been able to give so large a matter sufficient consideration to justify them in presenting a report.

NEW BUSINESS.

Mr. Gordon inquired if the Council had anything to present, by way of suggestion or otherwise, as to the future action of the Association. As the treasurer had pointed out, in a short time, at the present rate, the Association would find itself without funds. It was evident that there was a lack of interest somewhere, and something must be done to stimulate interest in the Association and promote a healthier state of affairs than now existed.

The President said the matter had been brought up and talked over in the Council, but, while all agreed that the present state of affairs could not be allowed to continue, nothing definite had been arrived at as to the course to be taken, and, as he had made a suggestion in his address, the Council had thought it well to see what action the Association would take on the lines suggested.

Mr. Burke entirely concurred in the tenor of Mr. Gordon's remarks, something must be done or the Association would find itself going back. As stated in the report, at the present rate in four years the Association would have no funds. Therefore some means would have to be devised to promote greater interest in the Association and increase the payment of membership fees, as well as to induce a better attendance at the conventions.

Mr. Dick said he was sorry to be unable to offer any advice. He fully appreciated the difficulty of the situation, but it was one thing to do that and another to

suggest the remedy. It certainly looked as if a majority of the members were not much interested, when they neither contributed their fees nor attended the Convention. He did not see anything to be aimed at except to get the government to take over the examinations. The examinations were the one thing of practical good they could point to as having been accomplished by the Association. He thought it would be a great pity if they were allowed to drop, but the Association could not carry them on without funds. He therefore thought it was desirable that the government should be induced to take them up, and did not see any reason why they should not, as they could be carried out in connection with the work of the School of Practical Science, which had all the necessary machinery for carrying them out.

The President said that to stand still meant practically falling back, and unless some effort was made at progress they would certainly find themselves dropping out of existence in a little time, and it would be a great pity that all the energy and effort hitherto expended should come to nought. If the examinations were not maintained the charter might lapse, and they would then be in a worse position than at the time of the Association's inception. He therefore agreed with Mr. Dick, that steps should be taken to keep matters going and have the examinations held. He thought there was reason to believe that, if asked, the government would be willing to take over the examinations. If they did so it would facilitate the plan of having degrees granted which has been proposed.

Mr. Kennedy (Barrie) reminded his hearers that Rome wasn't built in a day. While the Association had not done all that had been anticipated, yet he thought it had achieved much of good. Public notice had been drawn to the profession, and membership in the Association did confer a better status on an architect. He had noticed that in the law courts, when giving testimony, architects were asked if they were members of the O. A. A., and if they were it added to the weight of their testimony, and he thought that was a good deal.

Mr. Aylsworth expressed himself as being in harmony with Mr. Kennedy's views. He did not believe in giving up all effort to have the act amended, but if that could not be accomplished they might endeavor to get the government to carry on the examinations and conferring of degrees. But even if that could not be done they might do what had been done in England, where more use was made of their title than was done here, and make use of the title granted by the act, of Registered Architect. He thought it would be a great mistake to let the Association lapse altogether, for there was no knowing what good it might, in the future, accomplish.

The President said he hoped his suggestions would not be interpreted as intended to take the place of the first aim of the Association, viz., the improvement of the Act; they were merely intended to keep up the courage of members for the present, and hold them together. If the government assumed the examinations and granted a degree, he hoped that plan might, so to speak, be welded together with Mr. Gordon's idea, and the degree conferred by the government form one of the degrees contemplated by his scheme. In a conversation with Professor Galbraith he had learned that the position they desired to assume was quite in accord with what was being done with the civil engineers at the present time. The civil engineer might, on the one hand, engage in office work, and then go to the government university and by his experience in practical work obtain the title of C. E. On the other hand, he might attend the School of Practical Science for three years and at the end of that time get a degree, but he had then to engage in practical work, to show that he had done actual work; and he could then go back to the university for its degree. He thought that was exactly what the architects wanted; that, at all events, would be preferable to the present position. If the government took up the examinations they would be carried on in the manner provided for by the Act; students could study the stipulated number of years in an office and pass the examination, or attend the School of Practical Science for the necessary period and afterwards take up the office work, take the examination and get the diploma or degree. He thought this would prove an incentive for the students.

Mr. Burke said that Mr. Aylsworth and some others seemed to have formed a wrong impression of the position he took. So far from advocating the giving up of the Association, while there was an association of half a dozen members he might be counted on as one of them, but he called the attention of the members to the fact that the funds were decreasing year by year. No business house would go on year after year with an increasing deficit, but they would cast around to discover the cause of the decline. That was what the Association should do, they should look around for the cause of the apathy and lack of interest and endeavor to devise some means which would result in a more general contribution of fees. He thought members who did not pay their fees should have their names dropped from the roll, because they were availing themselves of the benefits accruing from membership without giving any equivalent for it. It was surely worth something to a man to be able to use the title conferred by membership in the Association.

Mr. Gregg said that he was prompted by Mr. Burke's remarks to move that a committee be appointed to consider the suggestion made of having the Provincial government take over the examinations, and to report to-morrow morning. Professor Galbraith, the Principal of the School of Practical Science, was a member of their board, and had always shown sympathy with them, and the committee he proposed might confer with Professor Galbraith and, if possible, with Dr. Ross, the Minister of Education, and would be able by the morning to have a pretty good idea as to the feasibility of the proposal. He thought the suggestion in regard to the examinations was a good one, and there was no reason why time should be lost if the matter could be put in shape now. He therefore moved for the appointment of that committee.

Mr. Siddall said that while he had listened very attentively to everything that had been adduced, he did not feel at all convinced that the adoption of the course suggested was desirable. Although the feelings expressed by members seemed almost unanimous in favor of the motion, he thought the proposed action was going against first principles. He thought the control of the education of the students should be in the hands of architects, and if the examinations were handed over to the government, as suggested, one of the principal objects of the Association would be gone; it would have less to do than heretofore, which he thought was not a good thing. Indeed, he believed that one reason the Association had not gone ahead more was that it had not enough to do; a meeting had been held once a year, and that was about all that was generally known about the Association. He thought a new spirit needed to be infused into the Council, that some of the younger members, those who had not practised ten years, ought to be made eligible to serve on it. For these reasons he was not inclined to support the resolutions before them.

Mr. Gregg said he had not suggested any names for the committee, but he would now suggest that Mr. Siddall be a member of it.

The President said it was a misapprehension to think that if the examinations were taken over by the government the Association would not have anything to do with them. They would be controlled and carried out under the act just exactly as they are now, and the government would appoint architects as examiners.

Mr. Siddall remarked that if the Association once surrendered its control of the examinations there was no telling what might happen in the future, the government might appoint any examiners they liked.

The President replied that they were governed by the act.

Mr. Kennedy thought handing over the examinations to the government would place them in a position too much subject to political influence.

Mr. Curry said it was impossible to continue carrying on the Association as it had been conducted in the past; it was evident members were not prepared to pay the fees necessary to continue it in that way. The question was, how long are we going to continue going to the parliament buildings looking for legislation? In his opinion it was perfectly hopeless, as there was a feeling abroad among the members of the Legislative Assembly that no more so-called class legislation should be enacted, or anything tending to the creation of close corporations, and however wrongly, the amendment sought by the Association had been regarded as of that description. He thought the only thing they could do was to curtail the expenditures and put things on such a financial basis as would render possible the carrying on of the Association; it would not do to go on eating up the surplus as has been done, until now little more than $1,000 was left of it. He saw no reason, however, for abandoning the Association. The duties of the registrar had been onerous in the last few years, mainly by reason of the extra work devolving upon him in connection with the attempts to secure amendment to the act of incorporation, and the cessation of those attempts would make possible a reduction of expenditure. He thought there was no reason why they could not continue as a voluntary association, without regard to the Act, which had really given them nothing. They had conducted the examinations under it, and what had it all resulted in? Students seemed not to think it of sufficient advantage to induce them to register and pass the examinations, knowing quite well that they were not debarred from practising by neglecting to pass the examinations; and he was not sure that it was advisable that they should be debarred in this age of competition. In regard to the suggestion that the examinations should be handed over to the government, he thought it would be wise to ascertain whether there was any inclination on the part of the government to assume them before spending time in discussing it. He did not see the analogy between the work of an architect and a civil engineer or an electrical engineer. The profession of an architect covered a very wide field, a man might be a poor constructionist and yet a very good designer, and capable of doing work in one or two divisions of his calling, not upon constructional lines or the lines upon which he would be examined. In the case of an engineer, it was essential that he should be thoroughly versed in that one particular line. Passing the examinations would not necessarily make an architect of a man, although it was no doubt a good thing to have as many architects as possible know as much as possible about construction and sanitary science, but that alone would not make an architect; a man who chose to call himself an architect had so many different lines upon which he could make a living that he was not forced to depend upon any degree to enable him to do so.

Mr. Gordon said it seemed to be assumed by most of those who had spoken that it would be a desirable thing to have the examinations taken over by the government but he had not heard the first reason assigned for that opinion, while many reasons occurred to him why that course was not to be desired, even if the government were willing, which he ventured to doubt very much. The only objection raised to retaining them was on the score of expense, but he had ascertained from the treasurer that a ten dollar bill would more than cover the expense of the last examination, which was a mere bagatelle. It was true this was effected only by the self sacrifice of the examiners, but no complaint had been heard from them, indeed he had heard it remarked by some of them that acting in that capacity was a good thing for them, because the study it necessitated was beneficial, though there was no financial recompense. The holding of the examinations was the central point in the act of incorporation, and something they ought not to be willing to abandon until good reasons were given for such action. He agreed with Mr. Siddall when he said that in order to increase interest in the Association it was necessary that they should do not less than they had been doing, but more. He thought that was perhaps, one of the best things that had been said in the meeting. It had been running through his mind, and evidently through the mind of the President also, and perhaps others, that there were many ways in which interest might be created apart altogether from the question of legislation. If it was thought that through lapse of time such changes would take place in the government as might at a future period place them in a better position to advance their aims in that direction he had no objection to waiting. The object sought was very important, and if anything could be gained by waiting they could well afford to do so. In the meantime they must not neglect more immediate improvements, or disregard the necessity of stimulating the interest of the members, and he heartily endorsed what had been said by the President about placing before the young men some incentive. Their object should be to adopt such means as would give them a standing before the public, as compared with those who did not belong to the Association. It had been pointed out that the standing conferred by membership was becoming recognized in courts of law, and further advance might be made along that line. He did not wish at the present time to bring up the broad question in regard to degrees, but, speaking to the present motion, he thought that the inauguration of some such system of conferring a certain position in the Association would do a great deal towards increasing membership. It had been said that many were in the Association only looking to see what there was in it for them. Unfortunately that selfishness was an element in all human nature, and the degree would give a status which to some extent would carry with it a financial interest. If any such scheme as that were adopted it would be desirable that they should have control of the examinations, because the one must of necessity work in with the other.

Mr. Baker said that before Mr. Gregg's motion was put he wished to say that he felt sure none of the members were surprised at the somewhat despondent view taken by the Council of the result of their efforts. He felt sure all most thoroughly appreciated the work they had done, and he wished more power to their elbow. But in every undertaking there were stages when things looked at their worst, and it was then that they began to improve. Was not this the time for all to take hold with a will and pull the Association out of the hole it was in? They must not be too despondent. He did not think the attendance had been so bad at the local chapter as some thought, and he believed that it was going to be a success. He thought Mr. Gregg's motion might be enlarged so as to include within its scope the whole question of reducing expenses. In regard to the examinations, he thought they should only be held in the event of there being a reasonable number of applicants. Certainly no government would think of holding an examination where only one in each class presented himself for examination, as was the case at the last one held.

Mr. Gregg expressed an entire willingness to change his motion in the way suggested, but in that event thought there should be further discussion of the financial question. He would change the motion and make it read: "That there be a committee appointed to report to-morrow upon the present state of this Association with regard to examinations, finances and membership, and to see what can be done."

Mr. Gray thought the questions proposed to be amalgamated in the one motion were too wide to be properly dealt with by one committee in the short time at its disposal. The questions of finance and keeping up interest in the Association seemed to him very much wider in range than the mere question of handing over the examinations to the government. Then he thought if there was to be any system of conferring degrees the Association must necessarily retain control of the examinations. In regard to the question of expenditure, he thought that was not so much in connection with the examinations, but in the management of the library and the registrar's fees. While he in common with all the members fully appreciated the excellent service given by the registrar, he thought some reduction in that direction was necessary. He thought it would be a good

(Continued on Page 16.)

MURAL DECORATION.

By G. A. Reid, R.C.A.

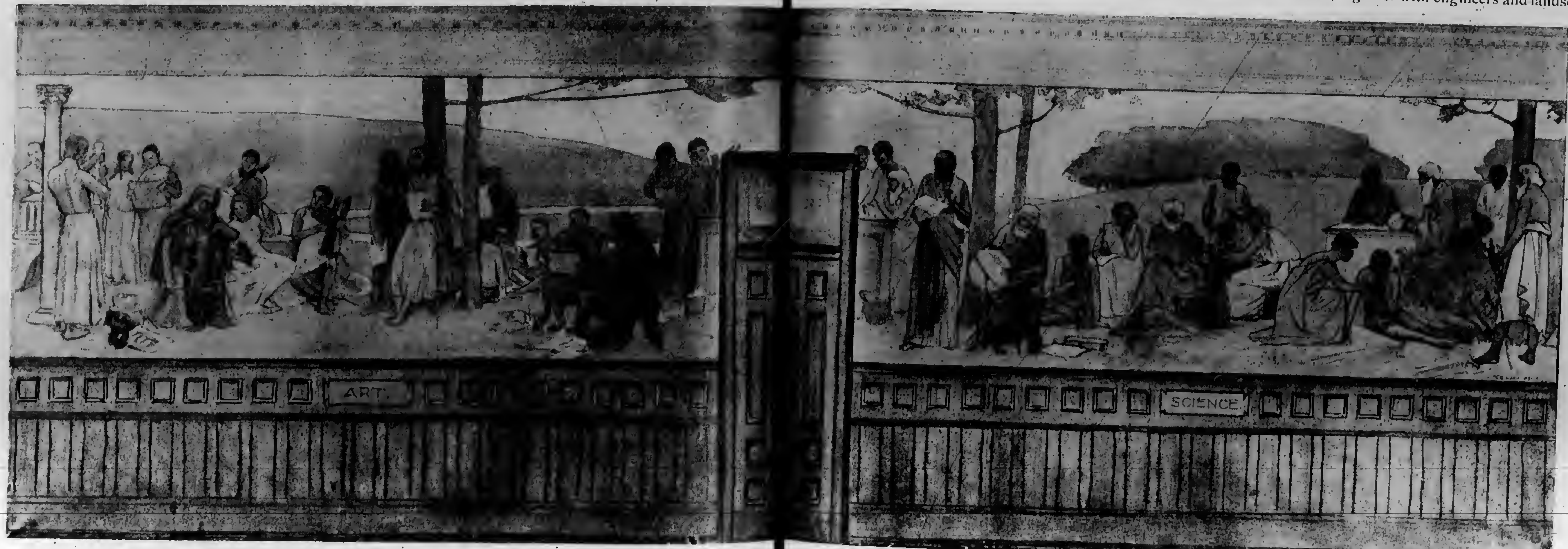
WHEN we contemplate in its complex manifestations that constant tendency of man to decorate and embellish every object connected with his existence, we are confused and perplexed on every hand by the theories of life and of use and beauty which are prevalent. It is therefore with the greatest difficulty in the expression of our ideas concerning the beautiful that we make ourselves understood, and to realize the nature of the problem it is necessary to simplify it to the greatest possible extent to obtain the key which will unlock its mysteries.

If we had not been able to look into the past by the aid of archaeology and history it would still have been possible for us to study the progress of civilization by comparisons drawn from the various races having separate social development, which exist at the present time. To simplify this question of the art impulse with satisfaction, we should observe with care the earliest attempts man has made to satisfy his wants, and by wide and extended comparisons to notice how, step by step, the simple has become complex. The limitations of the present article will allow, however, but a glance into the remote past.

The first picture our minds can form of primitive man must include the social relations — because no state ever existed except by misfortune where man was alone. Subsisting in a precarious manner, having only a rudimentary language largely made up of mimic signs, writing by means of pictures, using color and sound to terrify or attract, storing food, plundering neighboring tribes, these and many other activities in simultaneous development, acting and reacting, show us how the observation by the primitive man of cause and effect, constantly forced him to proportion the means to the end in his efforts to satisfy his desires. Art in such a state could not have had any other purpose than the production of what was useful, and what we find to be the impulse of humanity in the primitive forms of society, we must conclude to be the same in the civilized state. Such, however, has been the difficulty of making distinctions and expressing them, that we have come to draw dividing lines between the arts where no differences exist except in degree, and in the poverty of our philosophy, or our means of expression, we represent the stimulating and progressive elements of art activity as not being useful or necessary to the life of man. We speak of certain things as being necessaries of life, and of some of the primary arts as the useful arts, until our age has come to think of them as being entirely apart and separate from the fine arts, whereas the fine arts should be regarded as the crowning glory of all the arts, equally necessary and useful to man, who in his desire to reach the perfect existence, with the joy of life as the spring of his impulses, draws from nature about him every element possible which will contribute to his pleasure and satisfaction.

At the period that history begins, and we are able from actual examples of decoration to study and compare, we find that art has on all sides been highly developed in Egypt, Assyria and Greece. Egypt is taken to be the oldest civilization, and the enduring nature of its work and the faithfulness with which its artists depicted the various phases of the life of the people enable us to become well acquainted with their manners and customs and their arts. The pyramids, temples, palaces, tombs, obelisks and statues stand as the silent witnesses of an almost incredible power, and though we may marvel and admire the wondrous design, the gigantic scale, the expressive beauty of their art, and its exquisite finish, we should not make the mistake of thinking that either enduring quality or scale are necessarily the signs of a great art. But it is a fortunate thing for our age that the conditions have been such as to preserve almost without damage such a quantity of art treasures.

The character of the decoration used by the early Egyptians was of a very primitive order, and was profusely spread over every part of the surface of the walls, pillars and ceilings of their buildings, being mostly outline figures, and hieroglyphics deeply cut and highly colored, having a wide range of treatment from the realistic to the symbolic. Intimately related to Egyptians with their colossal works of art and hieroglyphics or picture writing, were the Chaldeans, the Assyrians,



ART.—By E. Wyly Grier, R.C.A. SKETCH FOR PROPOSED DECORATION IN[illegible]OR OF NEW CITY BUILDINGS, TORONTO. SCIENCE.—By G. A. Reid, R.C.A.

Hindoos, and many other interwoven nationalities.

The ideal age of decorative art as well as of architecture is generally said to belong to Greece. The conditions which produced its civilization were such that art became freed from being the mere glorification of dynasties and was the expression of individual freedom and of a self-governing people, and this is the spirit which, surviving every dark age, returns and shows itself in the revival of the arts. It is a vivid realization we receive of the myriad forms of Greek art at the time of its becoming fused with that of Rome when we visit the museum of Naples, where are kept the vast quantities of objects of familiar use—statues, bas reliefs, bronzes of all sorts, and wall paintings dug from the ruins of Pompeii and Herculaneum—and great as our interest always is in works of art separated from their original surroundings, when we walk the streets of Pompeii and notice the ruts worn by the wheels of the chariots, and the myriad feet that have trod the stone sidewalks until they hollow away from the walls of the houses; when we walk through the dwellings, factories, bakeries, shops, temples, and up the worn stairs to the high seats of the threatre, we begin to form such a picture of the art and life of that remote time that enables us to take in its meaning and realize their vital connection. Art had even then begun to wane; it was a foreign element, though produced in Rome. The Greek artist had been transplanted and was a hireling—and if we would believe Pliny, painting was a dying art.

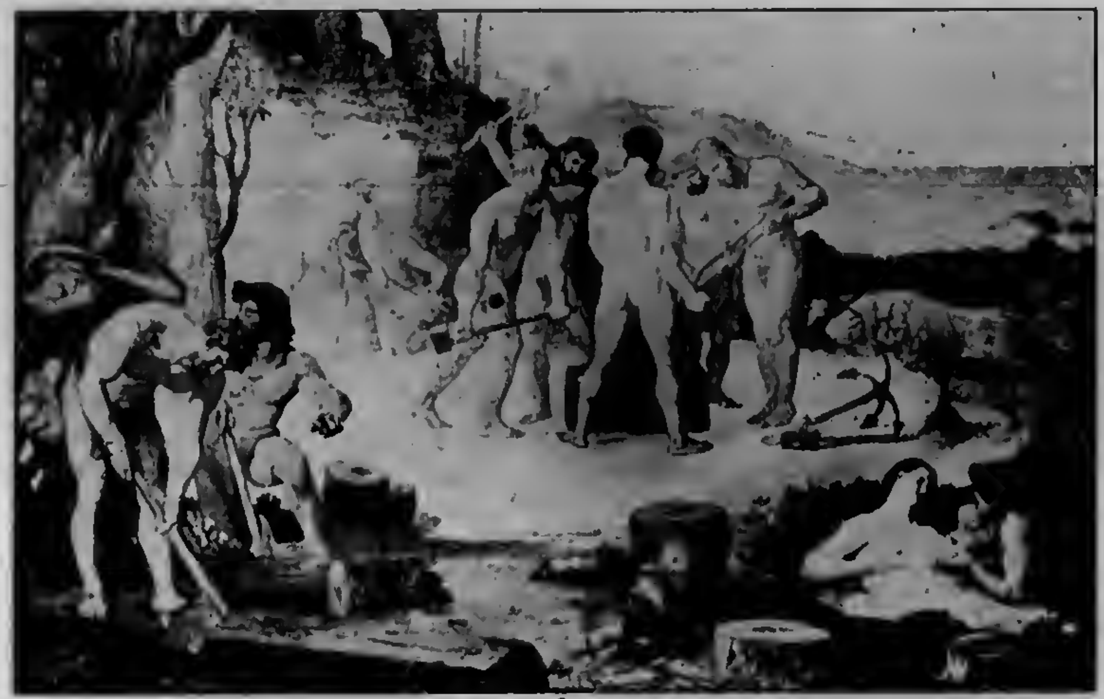
Throughout the different periods of art, whether it is the heroic age of Greek architecture and sculpture, which the Parthenon and its decorations represent, or the golden age of painting developed by Christianity, of which Michael Angelo and Raphael are the leading exponents, it is as we have already seen, only the rebirth in art of that spirit which alone gives it vitality—that it should express the life, not only of the individual, the community, the nation, but eventually become the expression of the aspiration of all humanity.

As there have been from time to time revivals of art activity of various kinds and degrees, due to enlightenment and the development of an individual and national spirit, so in our own time has arisen a movement which is making itself felt among painters and sculptors and is directing their attention towards the more adaquate decoration of architecture. This movement among painters is shown in the permanent wall decorations of all classes of buildings, but mainly of those of a public nature, their purposes requiring a more heroic treatment. That the more enlightened architects have also felt the movement has conclusively been shown in that dream-like wonder, "The White City," which sprang up in a place the name of which has almost become the synonym of the sordid and ugly, and that the conception of such a congruous art creation was possible in such a commercial age and in such a place should raise our hopes for the future and stimulate us to work for the higher possibilities of all phases of art.

When it had been determined that the treatment of the site, architecture and decoration of the World's Fair should be an attempt to obtain a harmonious effect, instructions were given the architects in general charge to call a meeting of the principal architects of the United States, together with engineers and landscape gardeners, to discuss a rough plan. When this was adopted the work, which was to follow a general style, was allotted. Chiefs of decoration in sculpture and painting were then appointed who employed the first sculptors and painters of the country to execute decorations which in most cases cou'd have only a temporary existence. We all know what a success this union of the arts was, and there can be no doubt of the effect of it on the minds of all who saw it. The results of it are being seen now on all hands. New York has realized that to protect itself from the erection of all kinds of inartistic monuments and public buildings, and to unite the arts in the process of beautifying the city, a board of art commissioners is necessary, and a federation of all societies of artists, sculptors and architects has been formed, which nominates these commissioners. Boston also has its commissioners, and other cities are moving in that direction. For many years France has had its Minister of Fine Arts; and a special budget which belongs to that department, and the city of Paris has its own art officials. Among the many cities making efforts to attain to a high ideal of civic adornment, Toronto has taken her first step, and an organization is at work in our midst

helping all worthy efforts to improve municipal art and which is alert to seize any opportunities that offer themselves where a body of art-loving citizens, artists and architects can initiate projects intended to beautify the city.

Of the recent examples of mural decoration which



WORK—(Puvis de Chavannes)—MUSEUM OF AMIENS.

might be cited, the number is so great that but a few can be noted. Standing out prominently are those to be seen in Paris, in the Pantheon, the Sorbonne, the different mairies of all the arrondissements, in many institutions and churches, and in the Hotel de Ville, which upwards of ninety artists have decorated with mural paintings, the subjects of which commemorate the history and progress of Paris. Many of the French cities possess decorations by the first painters of the day, and throughout Germany, Italy, Switzerland and other parts of Europe much of the same kind of work is being done. In England and Scotland the movement is on broad lines, and the recent arts and crafts exhibitions show that England takes the first place in the world in design. The decorations by Leighton at the South Kensington Museum and Ford Maddox Brown in Manchester are triumphs of English art. The works by Puvis de Chavannes, the great French decorator, John S. Sargent and Edwin A. Abey, recently placed in the Boston Public Library at a cost of upwards of $100,000, distinguish Boston as the first city on this continent to place in a public building decorations of high artistic merit. The new Library of Congress at Washington is perhaps the first public edifice erected on the principle laid down at Chicago for the building of the World's Fair, some sixty sculptors and painters having been employed to do the decorations under special heads appointed for both sculpture and painting. The total amount paid for this part of the work was about $300,000.

The method employed in modern decorations is almost entirely that of oil painting on canvas, with a wax medium which gives that flat surface seen in the frescoes of the old masters. The painting having been brought almost to completion, is fitted to its place and laid in a bed of composition which prevents any effect from dampness or chemical action. In the case of stone walls having to be treated, the stone surface is heated part after part to a high degree, and the pores filled with wax, when the same process of mounting the canvas is carried out. It is, however, possible in cases where a concave or convex surface has to be decorated to paint directly on a prepared ground of wax. This process of wax painting is allied to the encaustic painting practiced by the ancients, which it is believed possesses superior qualities of durability to that of fresco. For the use of modern artists, painting on canvas has the great advantage of being similar to the ordinary methods in which they have been trained by the painting of the easel picture. The fresco, as used by the old masters, while it had advantages and charms, seriously handicapped the artist, as he was obliged to paint each day a completely finished part, and as the work dried very much lighter than it appeared at first, one can imagine the mechanical difficulties that had to be dealt with.

The ordinary term fresco, meaning fresh, indicated the nature of the work, as it was painting done on fresh plaster, and the degradation of the method to the painting on old or dry plaster with colors mixed with glue size to make them adhere, caused the use of the term buon fresco, meaning real fresco. Thus it is a mistake to speak of most modern wall paintings as fresco; mural decoration, which is the general term including all methods, is being now more generally used.

The revival, therefore, of mural decoration is not a revival of methods but of the spirit which produced the great works of the old masters, and it is this which gives us the hope that it is permanent. The examples of mural decorations on this continent seemed to fully justify the efforts of a group of artists who four years ago prepared the foundation of the movement in Toronto, beginning with a proposition for the decoration of the council chamber of the new city buildings. That their efforts have been welcomed from all sides has been gratifying, and though there has been some criticism and condemnation, it does not in the least affect the proposal or the motives of those making it, the objections offered being based on entire misconceptions. Suffice it to say that the group of artists who first conceived the idea and determined on a plan to carry it out have found no reason to abandon any part

DANIEL.—(Michael Angelo)—SISTINE CHAPEL.

of it as far as the principle is concerned, but the work they began is now on the wider basis of a citizens' organization, whose objects have been recognized by the civic authority.

Besides this organization, which is incorporated under the name of the Toronto Guild of Civic Art, another much needed society, calling itself the League of School Art, has sprung up, whose purpose it is to provide reproductions of well-known and original works in sculpture and painting for the decoration of the walls of our public schools. Such efforts are additional evidences of the revival of the art instinct among us, showing the realization that is felt of the necessity of surrounding our lives with all that is beautiful.

There are dangers arising out of organization which will have to be met, but if due care is taken so that order may not become monotony, and enough attention is given to the stimulation of the individual initiative, the benefits accruing will largely outbalance any possible mistakes.

This is too plainly a sketch of the subject of mural decoration to require the attention to be called to it as such. The points to be emphasized in any treatment of mural painting are its wide scope and great power as a form of art expression; its philosophy and history cover the whole domain of art, and as in music the symphony is the most elevated form, or in literature the epic poem is its supreme effort, so decoration is to the arts of form their crown. While all art is but the expression of human desires and needs, the avenues of impressions through the senses subdivide it in subtle ways, the subdivisions becoming more and more ramified as each sense comes to the aid of the other, and as all the branches of art are interwoven to form the great fabric of expression.

SCHOOL OF ATHENS—(Raphael)—VATICAN.

DETAIL—TORONTO UNIVERSITY.

ONTARIO ASSOCIATION OF ARCHITECTS.

(Continued from Page 11.)

thing if some kind of affiliation with the Canadian Institute could be arranged and the library removed there. This would enable the registrar to control the really necessary business of the Association at a moderate cost.

Mr. Dick said the members must not delude themselves with the idea that the examinations could be carried on at a cost of ten dollars or any such sum. By the courtesy and good nature of the gentlemen who had conducted them that had been rendered possible, but it was not to be expected that that could continue ; it would be an imposition on good nature.

Mr. Burke remarked that in the English association the work of the examinations was conducted gratuitously by some of the busiest men in the profession.

The Registrar pointed out that the printing of the examination papers alone cost $25, and that when the examinations were held at the School of Practical Science the remuneration for the necessary attendant was two dollars per day for the five days. Last year the examinations had been held in his office, and there was no printing done, because only two students were examined.

The President said that in making his suggestion he had not thought so much of the actual expense of carrying on the examinations, but of giving the students something to work upon in the way of a diploma or degree.

Mr. Aylsworth thought it would be productive of better results were the work divided among three committees.

Mr. Gregg, in order to simplify matters, put his motion in this form : "That a committee be appointed to consider the suggestion made by the President in regard to the government taking over the examinations, and to report to-morrow."

Mr. Siddall moved in amendment, that in addition to the subject mentioned in the President's address, the whole future conduct of the Association be also included.

Mr. Burke said he would be very glad to support Mr. Siddall's motion if he would separate it from the other. Mr. Siddall said that would meet his views just as well.

The President then put Mr. Gregg's motion to the meeting as follows : "Moved by Mr. Gregg, seconded by Mr. Jarvis, that a committee be appointed to consider the suggestion made by the President with regard to the government taking the examinations, and to report to-morrow." (Carried.)

Messrs. Gregg, Jarvis, Siddall and Baker were appointed as the committee.

Mr. Siddall then said the committee he wished appointed was one to consider the whole future of the Association, and to bring in recommendations for improvement or any other recommendations they may think desirable. It had been stated that things were not in a proper state, and that there was very little prospect ahead of the Association. If that was the position it was necessary that they should take stock of themselves, and he wanted a committee appointed to do that.

Mr. Baker, in seconding Mr. Siddall's proposal, asked if it could not be accomplished by adding two members to the committee already appointed.

After some further discussion as to the desirability of one committee considering all the matters referred to, on motion of Mr. Siddall, seconded by Mr. Baker, it was resolved that Messrs. Aylsworth and Gray be added to the committee already appointed, and that it consider in addition to the question already submitted the question of the position of the Association and its finances.

The Registrar then moved the following resolution, which was seconded by Mr. Curry : "That the Ontario government be requested to make a systematic test of Canadian building material, the test to be conducted by the School of Practical Science, assisted by a committee of the Ontario Association of Architects."

Mr. Jarvis asked if it would not be advisable to add to that that some members of the Association be associated with those making the tests. He thought it ought to be seen that the piers or materials on which the tests were conducted were not much better in material or construction than those in every day use for building construction.

The Registrar said it was intended that these should be Association tests made by the government machinery but with the co-operation of the Association.

The resolution was carried.

The convention then adjourned until 10.30 on Tuesday morning.

SECOND DAY.

The proceedings of the convention were resumed at 11 o'clock on Wednesday morning, the President in the chair, when Mr. Edmund Burke read a paper opening the discussion on "Steel and Iron Construction." [This paper, with the discussion thereon, will be printed in a future issue.]

REPORT OF SPECIAL COMMITTEE.

The report of the Special Committee appointed to consider the question in regard to examinations, the position of the Association and its finances, was then read by Mr. Gray as follows :

JANUARY 12, 1898.

Report of Committee appointed by the Convention of the Ontario Association of Architects to consider the following questions, viz.,

1st. The question of Examinations.
2nd. " " " the Finances of the Association.
3rd. To consider the future working of the Association.

Your Committee met and beg to report as follows :

RE EXAMINATIONS.—Your Committee beg to recommend that the suggestion of the President, re Examinations, Degrees, etc., be referred to the following Committee, viz., Messrs. Gordon, Wright, Wickson and Siddall, to confer with the Council and to report at next meeting.

FINANCES.—This Committee beg to recommend to the Council that clause No. 1 in the by-laws under the heading "Salaries of Officers" be altered to read as follows : "The salary of the Registrar shall be fixed by the Council from time to time," and also recommend that the salary shall not exceed $100 for the duties of Registrar and Librarian. The Committee strongly recommend to the Council that the Registrar be instructed to make every effort to collect the membership fees outstanding ; and that clause No. 4, on page 5, under the heading "Members Fees," be enforced after this effort has been made.

THE FUTURE WORKING OF THE ASSOCIATION.—While the results from the untiring efforts made by the present and past members of the Council and Registrar, to further the objects of the Association, have been in some respects disappointing, this Committee would urge that those efforts be not relaxed, until they are rewarded by success. Your Committee would recommend that the word TEN in clause No. 2 of by-laws passed by the Association at the annual meeting be struck out, and the word FIVE be substituted. Your Committee strongly recommend the united effort of the members of the Association to encourage and maintain by their counsel, advice and personal attendance the local chapters inaugurated by the Association.

Signed, on behalf of the Committee,
J. WILSON GRAY, Secretary.

On motion of Mr. Gregg, seconded by Mr. Siddall, it was resolved that the Report of the Committee be received for consideration.

Mr. Dick suggested that the report be taken up subject by subject, beginning with that referring to the examinations. The report simply made certain recommendations, without giving any argument as to why the course recommended was thought advisable. He thought the Chairman of the Committee should state the reasons which induced them to come to the conclusions expressed.

Mr. Gregg moved that the first clause of the report, recommending that the matter of the examinations be referred to the Council, be adopted, and that Messrs. Wright, Gordon, Wickson and Siddall be appointed a committee to act with the Council in carrying out the recommendations of the report.

Mr. Gray seconded the motion.

Mr. Curry said he did not see any necessity for such a motion as the one before them. The committee had been appointed for the purpose of bringing forward some scheme of action, but the only thing they had done was to recommend that a number of gentlemen be added to the Council in the consideration of the matter. The Council had not refused to do its work, and it had not been shown that it was unable to do it, and under the circumstances he thought the motion was rather a peculiar one to be made.

Mr. Gregg explained that no slight whatever was intended toward the Council, indeed he thought they had been careful to guard against even the appearance of such a thing.

Mr. Curry said there was not the slightest objection to the Council conferring with the gentlemen named in regard to this matter, if desired, but the request should be made in a regular and proper manner.

Mr. Gregg thought the committee would be quite willing to change the wording of the motion, so that it should read : "That the subject be referred to the Council with a request that the following committee be consulted."

Mr. Curry said that in that form he had not the slightest objection to the motion. He was not raising any objection except on purely technical grounds, as to the way in which the matter was put. He also wished to remind them that there would be three new members appointed to the Council at the present meeting, which afforded an opportunity to place on the Council some of the gentlemen with whom the committee recommended that the Council should act. He felt sure the Council was willing to receive suggestions from any member, their only desire was to carry out the will of the majority of the Convention.

Mr. Gregg then changed his motion to the following: "Your committee beg to recommend that the suggestion of the President, re examinations, degrees, etc., be referred to the Council, and that the Council be respectfully requested to consult with the following members."

The motion in the amended form, being seconded by Mr. Gray, was then carried.

Mr. Gregg read the clause of the report dealing with finances, as follows : "This Committee beg to recommend to the Council that Clause No. 1 in the by-laws, under the heading 'Salaries of Officers' be altered to read as follows : 'The salary of the Registrar shall be fixed by the Council from time to time, and also recommend that the salary shall not exceed $100 for the duties of Registrar and Librarian. The Committee strongly recommend to the Council that the Registrar be instructed to make every effort to collect the membership fees outstanding, and that clause No. 4 on page 5 under the heading, 'Members Fees' be enforced."

Mr. Dick pointed out that while the report recommended the reduction of the salary of the Registrar it made no provision for lessening his duties, but, on the other hand, rather added to them because they urged that no relaxation be made in the efforts of the Council to procure legislation, and also recommend further effort in getting in the outstanding fees, which, of course, meant an increase of correspondence, etc., for the Registrar. He could only say if there was any member of the Association who, for the sum of $100 per year, was willing to undertake duties hitherto devolved upon Mr. Langton as Registrar, that member would have to be prepared to make very great sacrifices.

Mr. Curry agreed that there ought to be no cutting down of the Registrar's remuneration without a corresponding reduction in the volume of his work, which, in connection with the efforts to secure legislation had been tremendous.

Mr. Wickson thought it was quite likely the work of the Registrar for the coming year would be comparatively light, and as the Council would be fully informed of the nature of the duties performed by him he thought it would be well to leave the matter in their hands—that the salary of the Registrar be fixed by the Council.

Mr. Kennedy said he felt sure the efforts of Mr. Langton had been very highly appreciated by those who, like himself, lived in places outside of Toronto, and he deprecated the idea of any reduction being made in his salary, at all events for the present year.

Mr. Baker explained that the members of the committee recognized as fully as anyone the value of the past services of the Registrar, and the sum of $100 had only been inserted in the report after much deliberation on the part of the committee. The intention had been to place the members on their honor to make an effort to extricate the Association from the position in which it was, and the committee had thought there would not be wanting members who would be willing for a year or two to sacrifice their time in carrying on the duties of the Registrar. With practically no examinations and a small membership they would for a time be not very heavy.

Mr. Gregg said that in order to save time and simplify the matter the committee would strike out the recommendation as to the amount of the Registrar's salary, and leave it as follows : "That the salary of the Registrar shall be fixed by the Council from time to time." That would make the three clauses in the by-laws in regard to salaries of officers all read alike.

The President thought that would have to be put in the form of a notice of motion.

Mr. Gray pointed out that the clause in question was only a recommendation to the Council to consider the matter of salary.

Mr. Curry said it was not within the power of the Council to change the clause in the by-laws referred to.

The President thought it could be done in the way proposed, as a recommendation to the Council. The Council could report at the next meeting and take a vote of the convention.

Mr. Burke said that part of the difficulty could be eliminated. That was with the library. He felt sure there were a dozen members in Toronto who would undertake the labor incident to the small number of lendings of books and the care of the library. He felt sure the Council would loyally endeavor to carry into effect the wishes of the convention. He had no doubt Mr. Langton himself would be willing to continue the duties of librarian gratuitiously. That would obviate the difficulty at least to the extent of $100.

Mr. Curry said if the futile efforts at securing legislation were abandoned, which were the source of so much labor for the Registrar, in the way of preparing reports and dancing attendance at the Parliament Buildings, the salary might be reduced, but not otherwise.

The clause as amended was then carried, unanimously.

Mr. Gregg then read the next clause : "The committee strongly recommend to the Council that the Registrar be instructed to make every effort to collect the membership fees outstanding, and that clause No. 4 on page 5 of the by-laws, under the heading 'Members fees,' be enforced."

Mr. Wickson called attention to the fact that if the proposed action were taken at least two thirds of the members would be stricken from the roll. Although it might be advisable to have a temporary cessation of the attempts to procure amended legislation, it did not follow that the effort was to be finally abandoned, and in any future efforts, if the proposal of the committee was adopted, there would be a very small membership and a by no means unanimous spirit in the profession to support it.

Mr. Gregg pointed out that the recommendation did not call for immediate action, but only that after every effort to collect the outstanding fees had been made clause 4 of the by-law on members fees should be enforced. The Council might give any length of time they thought proper.

Mr. Dick thought that clause in the report ought to be made more specific. If the Registrar had repeatedly written to the delinquents and his letters had been unanswered, what further efforts were proposed? Then they ought carefully to consider what would be the effect of the proposed action. There were now 132 members ; if they dropped the 100 and retained the 32 what would be the position of the Association?

Mr. Siddall said that in most cases the notices sent out by the Registrar were laid aside and lost sight of, though members were willing and meant to pay. He thought if it could in some way be impressed upon members that if these notices were not attended to they would be dropped from the Association, many of them would pay up. He knew that in his own case that was the position, and he had no doubt there were many others the same. He thought in some cases a personal application would be successful.

The President said he did not think the Association

would like their Registrar to go round collecting fees in that way. The clause of the report might be added to the effect that if after a certain time the fees were not paid the member's name would be dropped.

Mr. Curry said the matter had been considered by the Council, and it had been found difficult to do anything. It was not desired to drive people out of the Association, and yet they did not pay their fees. He thought for the time being they would have to be simply a nominal association. He would propose an amendment to the clause under discussion, which he thought would answer the purpose: "The committee recommend to the Council that all members in arrears for more than three years shall be dropped from the list after notification by registered letter, but with the understanding that such member will be reinstated on the payment of all past fees."

Mr. Gordon seconded the amendment, remarking that it appeared to him to be the wisest course.

Mr. Burke also expressed himself as in favor of Mr. Curry's amendment.

Mr. Gregg stated that the committee willingly accepted the amendment, which was then declared carried.

An adjournment was then had for luncheon, which was served in the building.

AFTERNOON SESSION.

Proceedings were resumed at 2.30 p.m., when that part of the report of the committee dealing with "The Future Working of the Association," was taken up for discussion.

Mr. Gregg explained that the first clause under this head might be regarded merely as a preamble, it was merely giving credit to the Council for work done in the past under adverse circumstances, and expressing the opinion of the convention that they should not be discouraged but continue in their efforts. He moved the adoption of the clause.

Mr. Siddall, in seconding the motion, said that it was felt by the committee that while it was not desirable to abandon altogether the idea of securing the legislation to amend the charter of the Association, yet it was not necessary that object should be immediately pushed forward. By too much persistency in an indiscriminate manner the Association might make itself a nuisance, and it might be better to cease action in that direction for a period, until at some future time, under improved conditions it might be pushed to a successful conclusion.

The President suggested that as the clause was, as Mr. Gregg had said, merely a preamble, a separate motion was not necessary, but it might be taken in connection with the next clause, and the two passed under one motion.

Mr. Gregg assented to the proposition, and proceeded with the next clause of the report: "Your committee would recommend that the word "ten" in clause No. 2 of the by-laws passed by the Association at the annual meeting be struck out, and the word "five" be substituted." He explained that this would make a member who had been five years in practice eligible to a seat on the Council.

Mr. Dick said he had been looking over the by-laws, and found there was no provision for amending them.

The Registrar, having been asked whether any amendment had hitherto been made to the by-laws, stated that in 1895, just before the election of officers, the President presented a recommendation from the Council that retiring members be not eligible for re-election for one year, and this recommendation was passed at the same meeting as a by-law.

Mr. Curry, while personally in favor of the proposed change felt it would be a mistake to alter a by-law at a meeting when notice had not been given to all members of the proposed amendment. He thought the proper course was to give notice of motion now and let the matter go to the Council.

Mr. Gray explained that it was simply a recommendation to the Council, and the committee had not expected that the by-law would be changed at the present meeting.

The Registrar explained that it was not within the scope of the Council's functions to deal with this portion of the by-laws, which were passed by the Association in convention.

The President suggested that the clause be amended by adding: "And that this recommendation stands as a notice of motion to be discussed at the next convention."

Mr. Gregg having accepted the amendment suggested by the President the clause was then adopted.

Mr. Gregg then proceeded with the last clause of the report: "Your committee strongly recommend the united effort of the members of the Association to encourage and maintain by their counsel, advice and personal attendance, the local chapters inaugurated by the Association."

This clause was adopted without discussion, and on motion of Mr. Gregg, seconded by Mr. Gray, the report as a whole, as amended, was then received and adopted.

On motion of Mr. Wickson, seconded by Mr. Dick, a vote of thanks was then passed to the committee which prepared the report.

On motion by Mr. Gordon, seconded by Mr. Curry, the Committee on Building By-Laws was reappointed, the members being Messrs. Gordon, Burke, Pearson, Dick, Hall, Strickland and Wickson.

Mr. Gregg said that, referring to the Committee on Municipal Adornments, he observed that there was now a committee in Toronto for that purpose, and he would move that that committee of the Association be dropped.

The Registrar said he had been requested by the Advisory Board of the Toronto Guild of Civic Art to extend an invitation to any Toronto architect to become a member of that guild. The treasurer was Mr. James Bain, Public Librarian, and anyone who desired might become a member by sending his name to that gentleman, together with the sum of one dollar, the annual subscription fee. The Advisory Board of the Guild of Civic Art consisted of nine laymen and three architects, and had been accepted by the City Council of last year as an independent body that might be referred to in the appointment of experts, or to act with a committee of their own members in judging of competitive drawings and assisting in the decoration of the new City Hall. The guild was an absolutely independent body, and under its rules no member could receive in any form any emoluments for his services.

Papers were then read by Mr. Wickson on "The Supporting Strength of Different Kinds of Soil; by Mr. Pearson on "The Supporting Strength of Stone Rubble and Brick Walls; by Mr. Curry on "Deterioration as Affecting the Value of Buildings," and by Mr. Gordon on "Wooden Posts and Beams." Reports of these papers and of the discussions following will appear in the CANADIAN ARCHITECT AND BUILDER later.

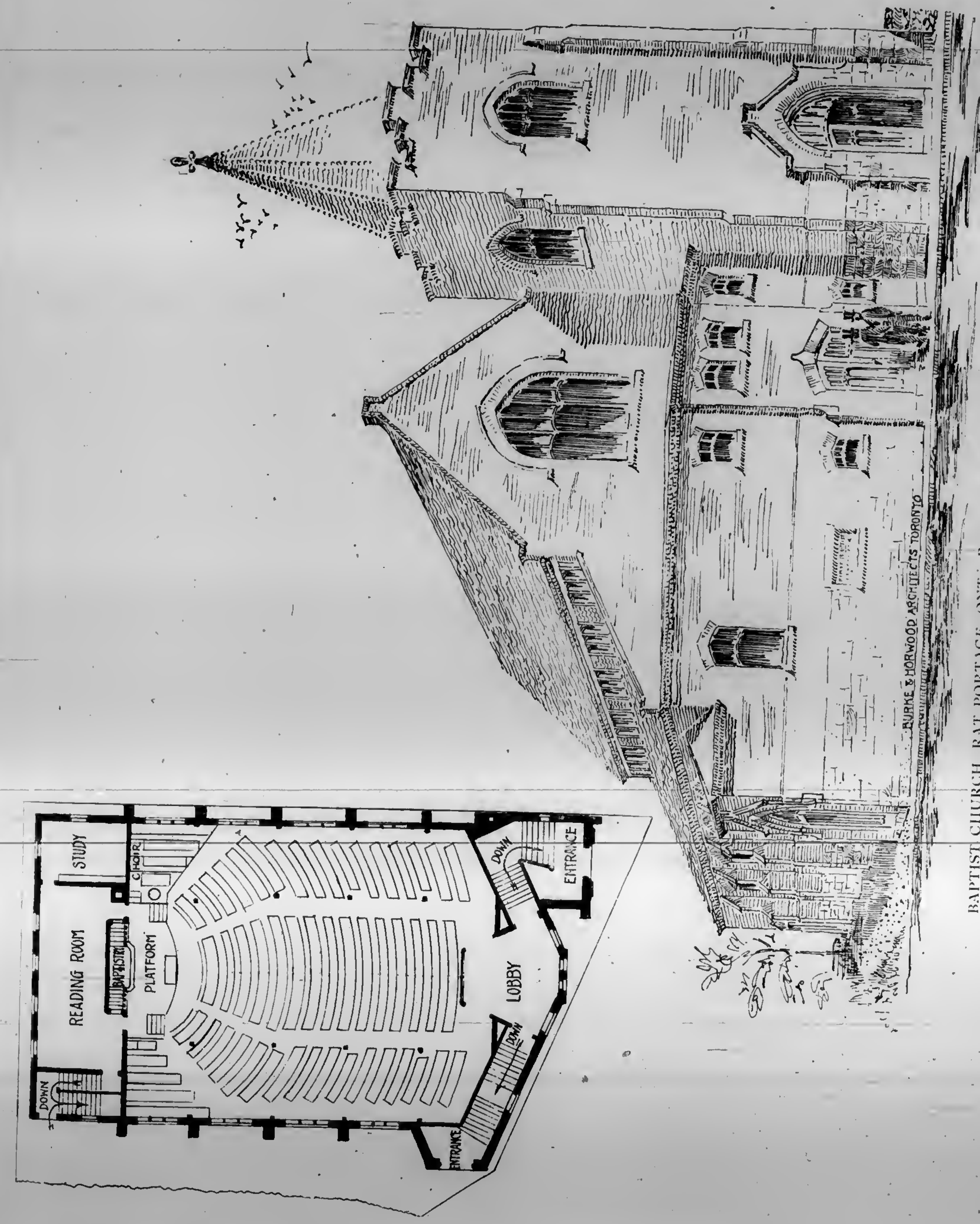
In concluding his paper Mr. Gordon moved the following resolution:

Whereas there exists no satisfactory compilation of the results of tests of Canadian building materials. And whereas no exhaustive or even relatively complete system of tests has been made of Canadian woods used in building. And whereas the architectural and engineering professions are thus left without accurate information about the materials they are constantly required to use. And whereas the safety of the public and economical use of our native building materials require that such tests should be made. And whereas the Ontario Legislature has emphasized the importance of this matter by providing the School of Practical Science with expensive and efficient testing apparatus. And whereas the benefit of having such apparatus is largely nullified by lack of funds to select and prepare suitable specimens and carry on a complete system of tests.

The Ontario Association of Architects in annual convention assembled respectfully petitions the Ontario Government to place at the disposal of the School of Practical Science an adequate fund for the purpose of selecting and preparing specimens of Canadian building materials and making extended tests of the same for the purpose of preparing reliable data for use in the building trades. And the convention is of opinion that a sum of not less than $5,000 should be given to institute such tests.

It was pointed out that a motion to the same effect was carried on the previous day, but the mover of the previous resolution (Mr. Langton) said that Mr. Gordon's resolution was more exhaustive, and he would second Mr. Gordon's motion as a substitute for his own. The motion was carried.

The election of officers then took place. Of the four members elected in the previous year, viz., Messrs. Bell, Curry, Darling and Dick, one had been elected to supply the place of Mr. Alexander, of Ottawa, who resigned at that time with one year of his councillorship to run; but no distinction had been made in the election so as to define which of the four councillors elected



BAPTIST CHURCH, RAT PORTAGE, ONT. BURKE & HORWOOD, ARCHITECTS.

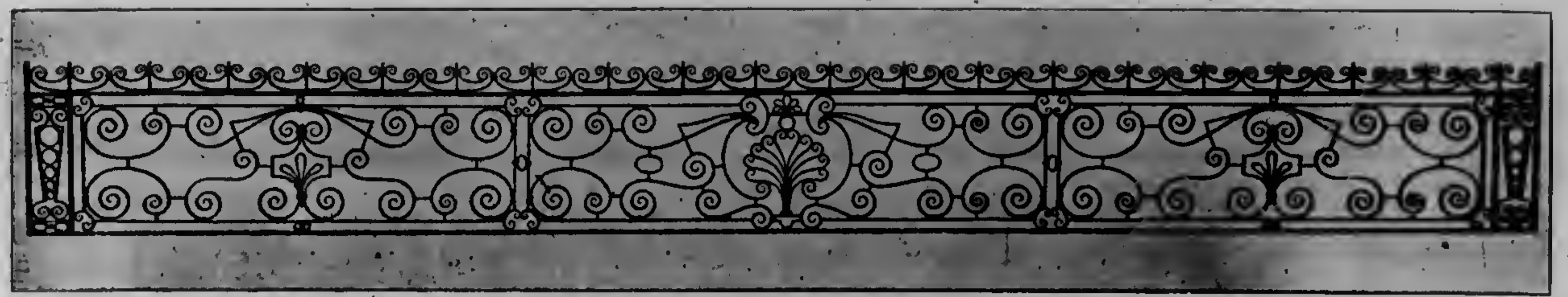
was Mr. Alexander's substitute, and therefore now to retire. It was decided that Mr. Bell should continue in the Council to preserve the balance of members not residing in Toronto. The three Toronto members then drew lots which should retire, with the result that Mr. Curry was drawn to retire.

The ballot for new members of the Council resulted in the election of Mr. J. E. Belcher, of Peterborough, and Messrs. S. H. Townsend and A. F. Wickson, of Toronto.

A vote of thanks was presented to the Auditors, Messrs. H. Langley and W. R. Gregg, and they were asked to act again.

Votes of thanks were passed to the readers of papers, to the Hon. Minister of Education for allowing the use of the building, and to Prof. Galbraith, Messrs. Wright and Keele and other members of the School of Practical Science for their kind assistance.

The convention then closed.



WROUGHT IRON GRILLE IN WINDOW OF NORDHEIMER BUILDING, KING STREET, TORONTO.—Curry & Baker, Architects.—Executed by Geo. Meadows.

LATHE WORK IN INTERIOR DECORATION.

By Fred. T. Hodgson.

TURNING, as every mechanic knows, is the art of shaping wood, metal, ivory or similar materials, into forms having a circular section, and also of engraving figures composed of curved lines upon a smooth surface, such as beaded rosettes, or angle blocks for door or window trimmings, similar to that shown at A, Fig. 1. Turned work is executed on a machine the working part of which revolves very rapidly when used for wood turning, and less rapid when used for ivory, brass or iron. The art of turning is a very important one, and the expert is able to execute the most delicate articles of luxury and ornament, as well as works required for every day use. To be able to turn out work suitable for balusters, newels, angle blocks and similar work, does not require an extra amount of skill, and every wood-working shop

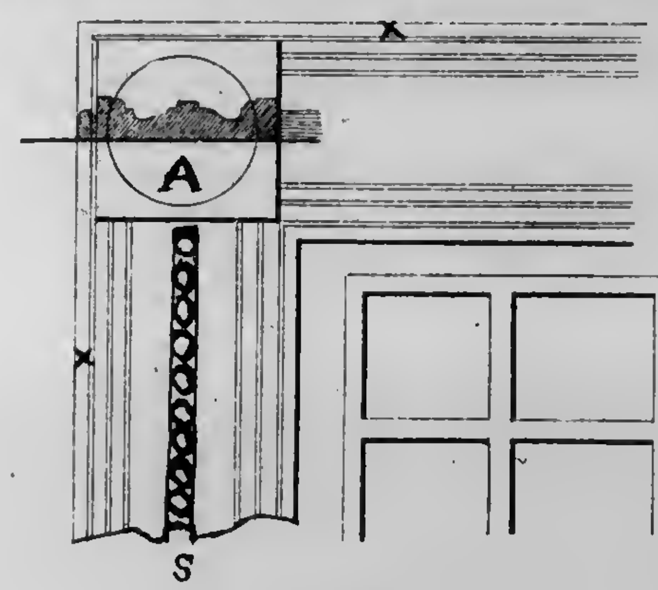


FIG. 1.—CORNER BLOCK.

in the country generally employs one man—if the proprietor does not feel competent himself, or has no time—that is able to make just such work as I have mentioned with very little practice; and the cost of a lathe for turning wood alone, and one suited to a small shop, ought not to exceed $75, a trifling sum compared with the advantages to be gained by having one in working order.

I do not intend to say much about the lathe itself, as this article is intended to show how lathe work may be applied, with good effect, to interior finishing, than to describe the machine or show its capabilities. It may

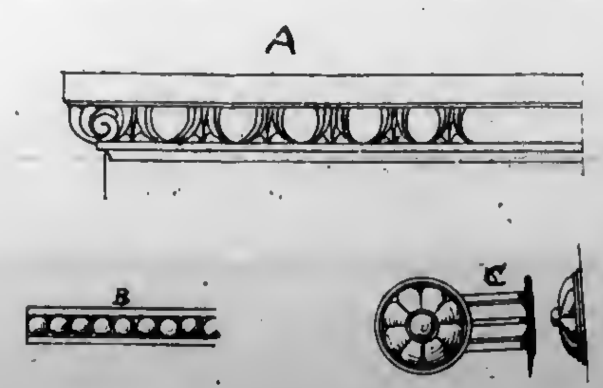


FIG. 2.

not be out of place, however, to refer briefly to the antiquity of the art of turning. The date of the origin of turning is lost. The art was probably known long before historians began to write, as the oldest Egyptian monuments had representations of the potter at work with his lathe, and in Scripture history we have in Jeremiah a distinct allusion to the potter and his wheel; this date is about 500 B. C. In Wilkinson's "The Manners and Customs of the Ancient Egyptians" he says: "Potters are represented at work with their wheels in the tombs of Thebes and Beni Hassen. The potters' wheel, while it is run on the principle of an ordinary lathe, only vertical instead of horizontal, lacks some of the qualities of the modern lathe, inasmuch as it has no "tail block" or "back centre." This want

FIG. 1.—SUNKEN ROSETTES.

was supplied by Thedorus, a Greek mechanic and philosopher, about 560 B. C. He also placed his lathe in a horizontal position and gave the principle of the present lathe to us. Of course it has been improved step by step since first invented until its present, almost perfect condition was reached.

The possibilities of lathe work as an interior finish is unlimited; there are so many things to which it may be applied—a few of which I will submit. A, Fig. 1, shows an ordinary turned corner block; usually this is left thicker than the casing and when in position a small moulding x is broken round the frame on its vested edge. This corner block may have the turned work either sunk or intaglio, or a turned rosette may be planted on. In either case the turned block adds considerably to the appearance of the work, and the labor in putting on the finish is materially reduced as there are no mouldings to mitre, only the small band at x.

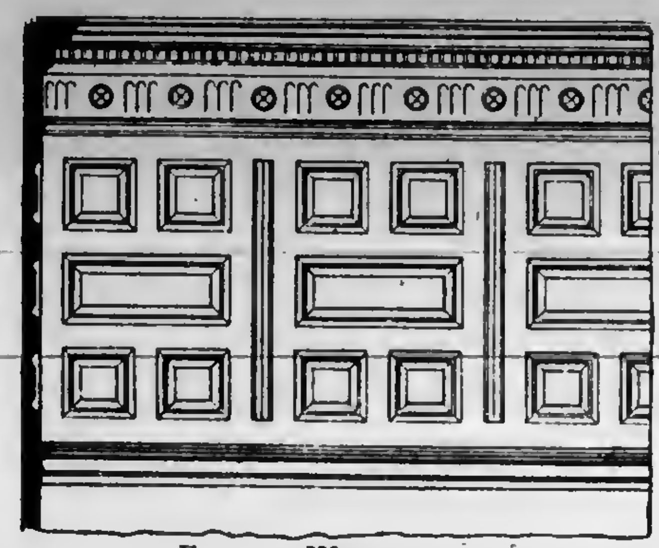


FIG. 4.—WAINSCOTING.

If it is desired to make the work more elaborate a centre plough groove may be made in the casing, say an inch wide and three eighths of an inch deep, and the half of a turned moulding may be planted in the groove. This moulding is a straight piece of turned wood, any length, with simply a number of balls or ovals turned on it at regular intervals; when finished it should be split down the centre with a thin saw. In this case the balls or ovals will require to be one inch in diameter. It will readily be seen that the turner may exercise his taste in the design of moulding, as he may alternate the ball or oval with a bead or angle, or he may make one long and one short oval, or change the shape one hundred ways. As a trick of the turning trade, I might first say, that the professional takes two pieces of stuff, joints them to right dimensions, then glues another piece of stuff on the paper. He then centres his work on the line of the paper joint, and when finished in the lathe he forces the blade of a knife or a chisel in the joints and the paper splits and separates nicely and truly. This method of ornamentation may be applied to a thousand things. The bottom rails of parlor sashes, rails of doors, base, rails of wainscoting or mantels and other fittings.

Fig. 2 shows three methods of using turned work. A shows what is known as egg and angle. The corner piece is, of course, carved and the angle in this case is

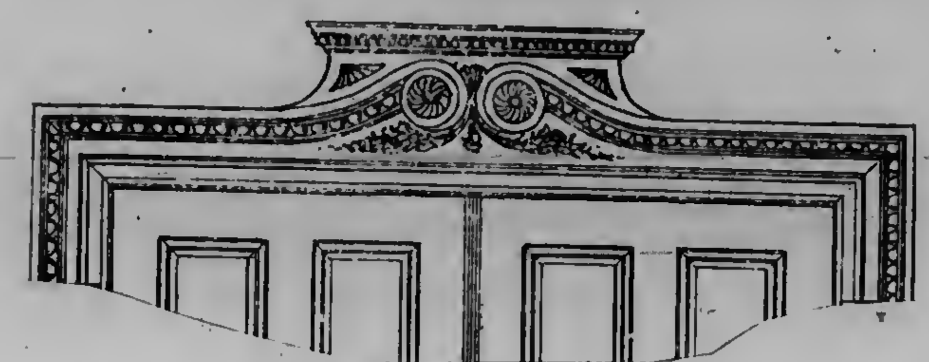


FIG. 5.—SLIDING DOOR FINISH.

also "trimmed out." The whole of this is wrought in the lathe in suitable lengths and is then quartered, so that one length of turned work makes four lengths of moulding. This should be glued together in four pieces with paper between the joints and care must be used in centreing the pieces or some of the quarters will be smaller than others. In laying out turned work of this or similar kind, proper lengths should be used in order that the mitre or other joints may work in all right without showing an irregular junction.

B, Fig. 2, shows the manner in which the moulding at S, Fig. 1, is arranged. Sometimes this moulding is made in a strip the same as shown at B, with a fillet on each side so as to plant on some work prepared for it. Of course the strip will have to be ploughed, and the turned moulding planted in it.

C at Fig. 2 shows a raised rosette and section of same. This is first turned to shape, with the little ball in the centre as shown, and then it is lined off and carved. Any joiner or turner can carve these rosettes after half an hours' practice. These little ornaments may be used in many ways for decorative purposes. A good way to use them or any other rosette is to have them made all to one size and then, with an expansion

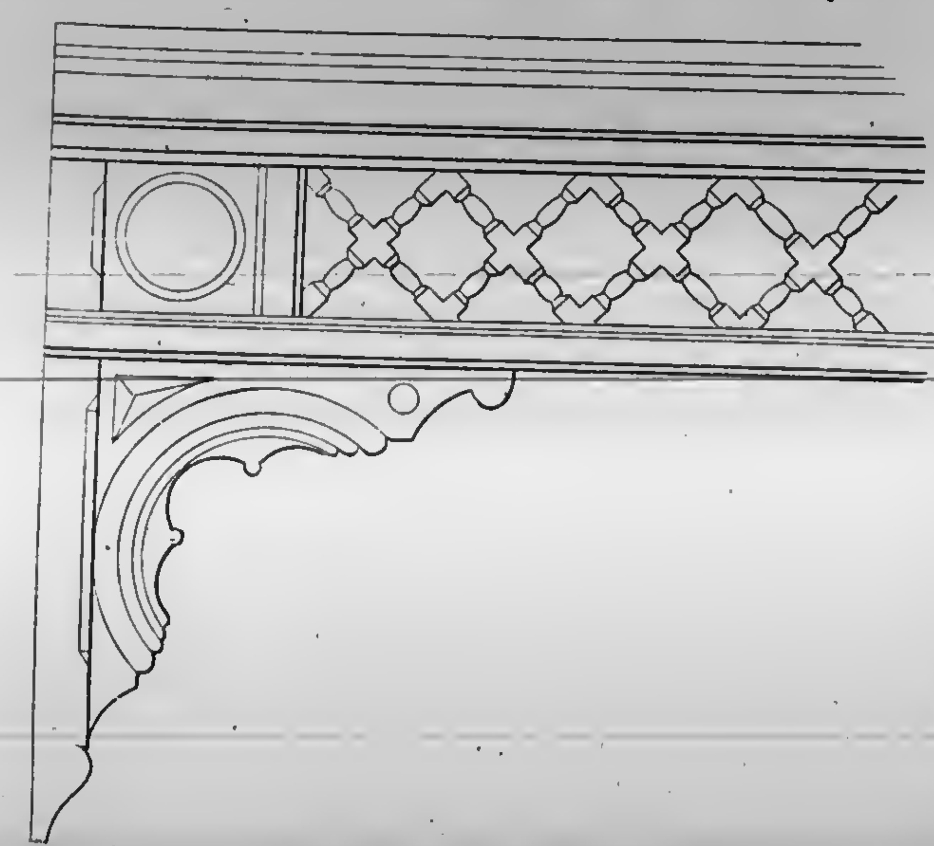


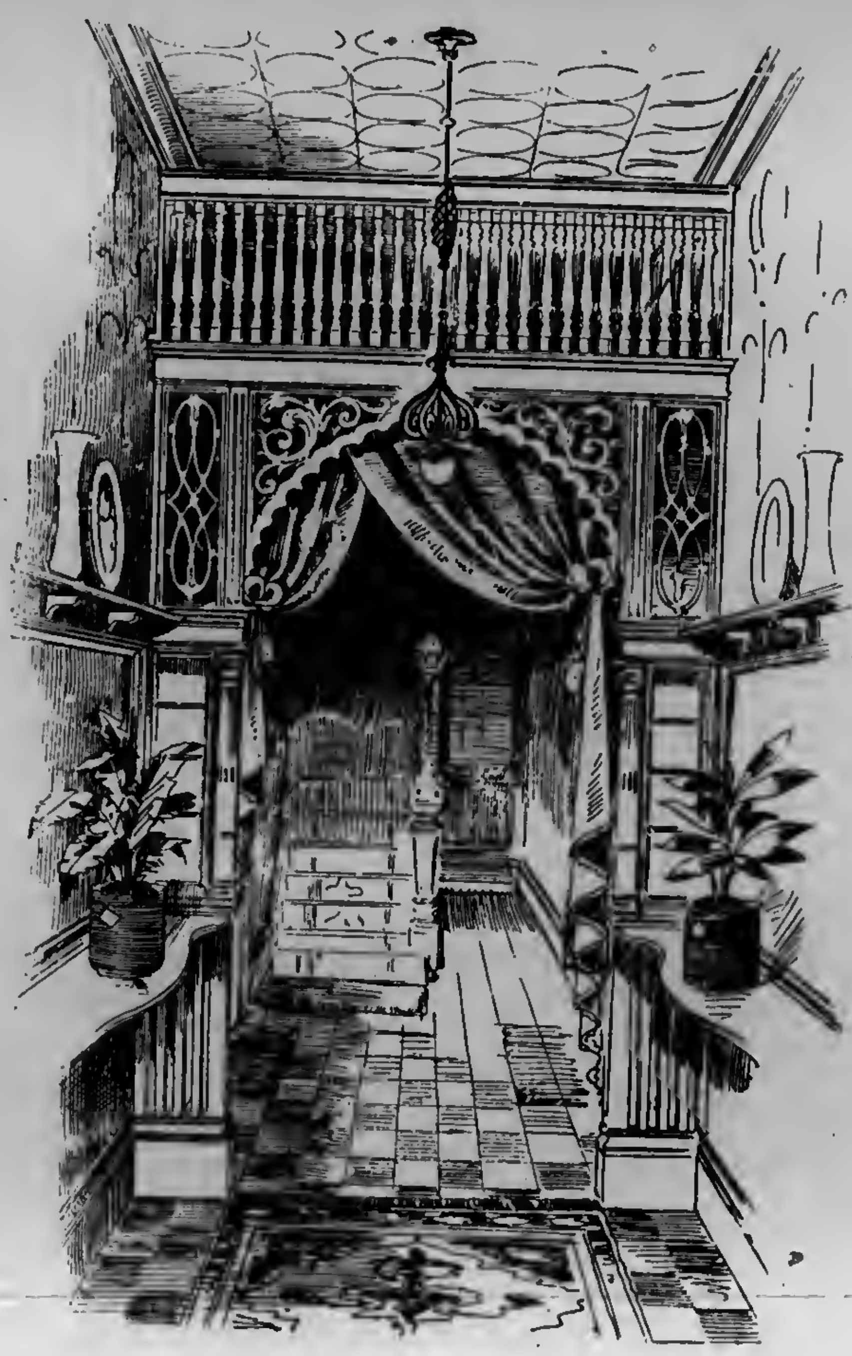
FIG. 7.—DESIGN FOR ARCH ACROSS HALL.

bit, bore holes in the work where they are to go, and drop in the rosette until it is flush with the face of the work. This can be done even if the face of the work is beaded, as is shown at Fig. 3, when the rosettes are flat with small beads turned on their faces to correspond with the work into which they are inserted.

At Fig. 4 I show a portion of panelled wainscoting in which are inserted rosettes in the freize at regular intervals. The cornice or top finish consists of several members, and the reader, if he follows this design may substitute the "egg and angle" for the dentils; indeed it would look much better if the latter were employed.

Fig. 5 shows how the egg and angle moulding and rosettes may be applied to the finishing of doors or windows. This is especially designed for a pair of sliding doors, but it will answer equally well for single doors or for a window. The rosettes are carved and are planted on. They may be simply beaded like those in Fig. 3, or they may be made like C, Fig. 2. The carving underneath the rosettes may be dispensed with if the workman has not sufficient skill to cope with it, though I have seen many country joiners who would have no trouble in doing this carving.

An arch thrown across a hall or passageway is a good decorative idea. It may be simple and easily made as Fig. 6, or it may be elaborate and assume the nature of a grille, similar to the design shown in Fig. 7, which is taken from the London Cabinet Maker. The



A NARROW HALLWAY TREATMENT.

FIG. 7.

idea is, of course, capable of considerable extension, as it also is of limitation, and though the design before us may seem very costly, as a matter of fact it is not beyond the reach of moderate means.

Turned or spindle work may be employed to advantage in the construction of screens for windows or for grilles over nooks and corners where it is intended to hang curtains. Shelves over doors and windows with spindle railing make both a useful and decorative finish. Such features are quite common in France, Germany

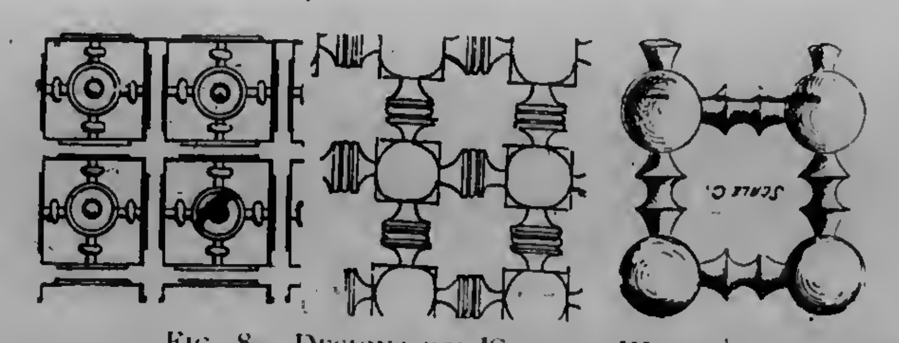


FIG. 8.—DESIGNS FOR SPINDLE WORK.

and some parts of England, in middle class houses.

To give the operator an idea as to the manner of making grilles, screens or spindle work, I submit a few designs, Fig 8, from which he may gather sufficient

data to enable him to make work from these designs or invent more suitable ones, and I am sure the country builder, who is left to his own resources to ornament and beautify the houses he builds, will be able to find many places that will be greatly enriched by the introduction of appropriate lathe work.

I have made no reference to balusters or newels, knowing that every builder must have some knowledge of these, and with this knowledge and the hints given herewith he will be able to elaborate and vary his work in such a way as to make it handsome and in good taste.

THE DETERMINING QUALITY IN STAINED GLASS WINDOWS.

By Robert McCausland.

Considerable difference of opinion exists between the Old-World artists in stained glass and those in America with regard to the glass that should be employed in figure windows and church glass in general. Also as to whether painting, to any great extent, should enter into the formation of such windows. The fact that artists of undoubted ability conscientiously oppose each other in these matters is proof that good qualities are to be found in both styles. It may therefore be interesting to note the points which constitute these qualities, and make both, to a greater or lesser degree admirable, though so widely different. The English method consists of painting with a brown enamel and amber stain on various colors and gradations of glass, technically known as "antique." The American method consists of a series of inlays of "opalescent" glass without painting, except in the flesh portions, which are usually executed in semi-natural enamel colors and afterwards backed, or plated, with a pale film of smooth opal glass, thus bringing the flesh into harmony with the draperies and accessories of the picture, the outlines of which depend largely on the lead lines to express the artist's aim.

The possibilities of either style are not gauged by individuals or centuries but lend themselves to a thousand and one phases which will always allure the creative mind.

The essential points of a figure window, or any decorative effort in stained glass, are 1st, color; 2nd, design; 3rd, painting. If the color scheme is satisfactory, one may forgive inferior design; on the contrary, however excellent the design or painting, if the distribution of color be inharmonious, the result is disappointing. This is forcibly illustrated in much of the early glass, which, though often grotesque in detail, is charming in its color values.

"Lo! as at Dawn the Eastern windnws glow
With miracles of color and tracery fine,
While all the west is cold; till soft and long
The deepening shadows in the chancel grow,
And the day wanes—then like a flood of fire
The Great West Window all aflame doth shine,
And lends a mystic glory to the song
That floats from out the dim, half-lighted Choir."

What is the cause of this "mystic glory?" Is it the design or painting of the glass? It is perfectly safe to attribute the cause alone to color. All three qualities however are necessary in good modern work. The early glass is immensely valuable in proving to us the importance of determining color schemes that will enhance the architectural features of the interior, and it would be difficult to point to an instance where early windows fail in this respect, which is more than can be said of much recent work, the cause of which will be referred to later.

In the best modern English windows the designing, working cartoons, arranging the coloring and painting of the glass, are the work of carefully trained artists, each stage of the work receiving equal care and skill. The result under these conditions is invariably satisfactory and fulfils its purpose to a degree worthy of the closest observation.

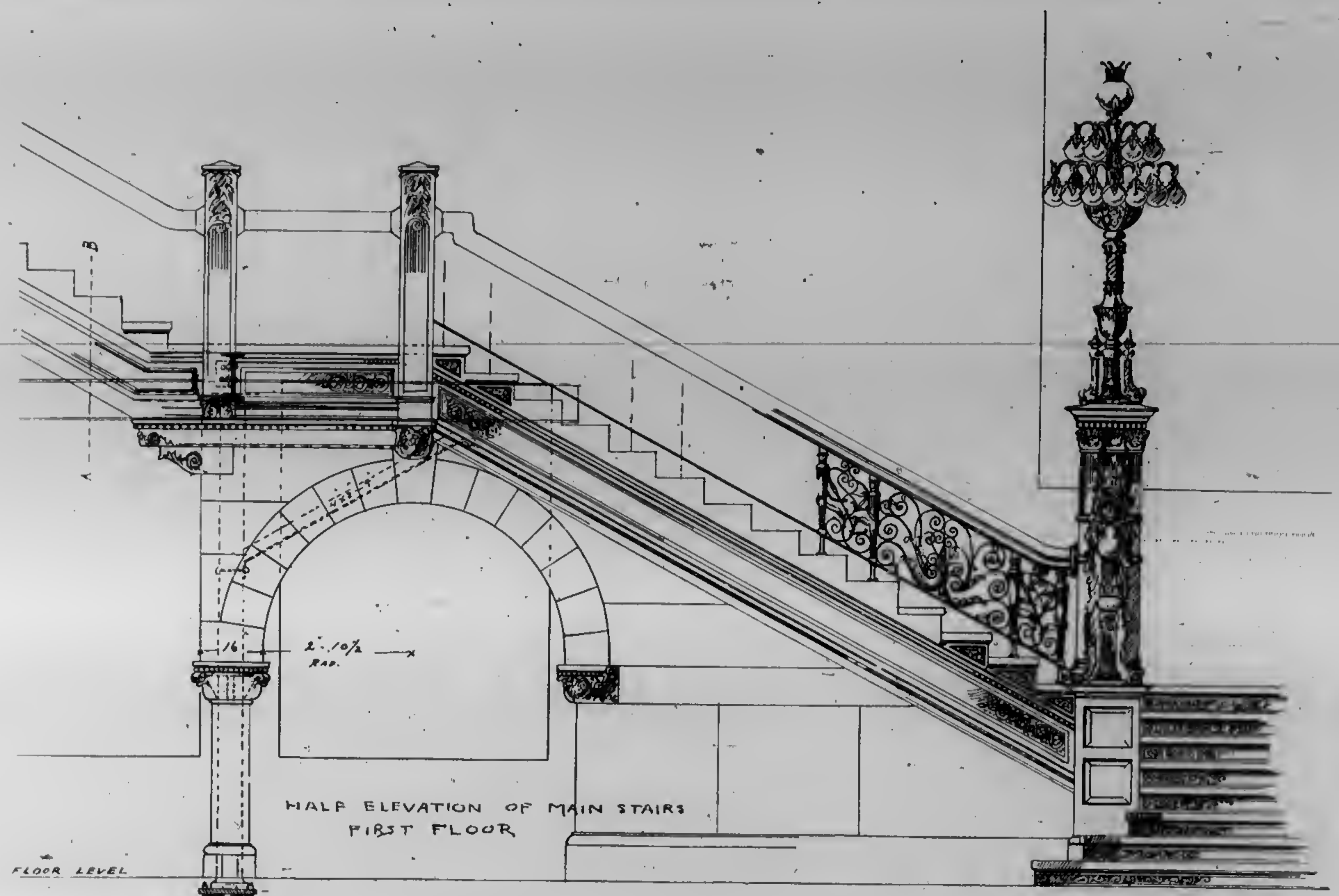
Rear View Toronto University.—Cumberland & Storm, Architects.

There is indeed a refinement and decorative grace in their best windows and a desire to maintain a symmetry of scale which others would do well to profit by. A disregard of this latter item has led to the perpetual ruin of some fairly good interiors, Trinity Church, New York, to wit, and Grace Church too, where one is asked to "go and view the windows"—not the church. Now truly the windows should not protrude themselves at the sacrifice of all else—but in the absence of an artistic governing influence, individuals and their choice of artist have too often a free hand—hence many churches contain a great variety of "specimens of memorial windows."

The importance of an equality in scale, therefore, as well as a continuity of design and studied color scheme throughout, must be apparent. It was this very principle that brought about the effects we so much admire in early glass.

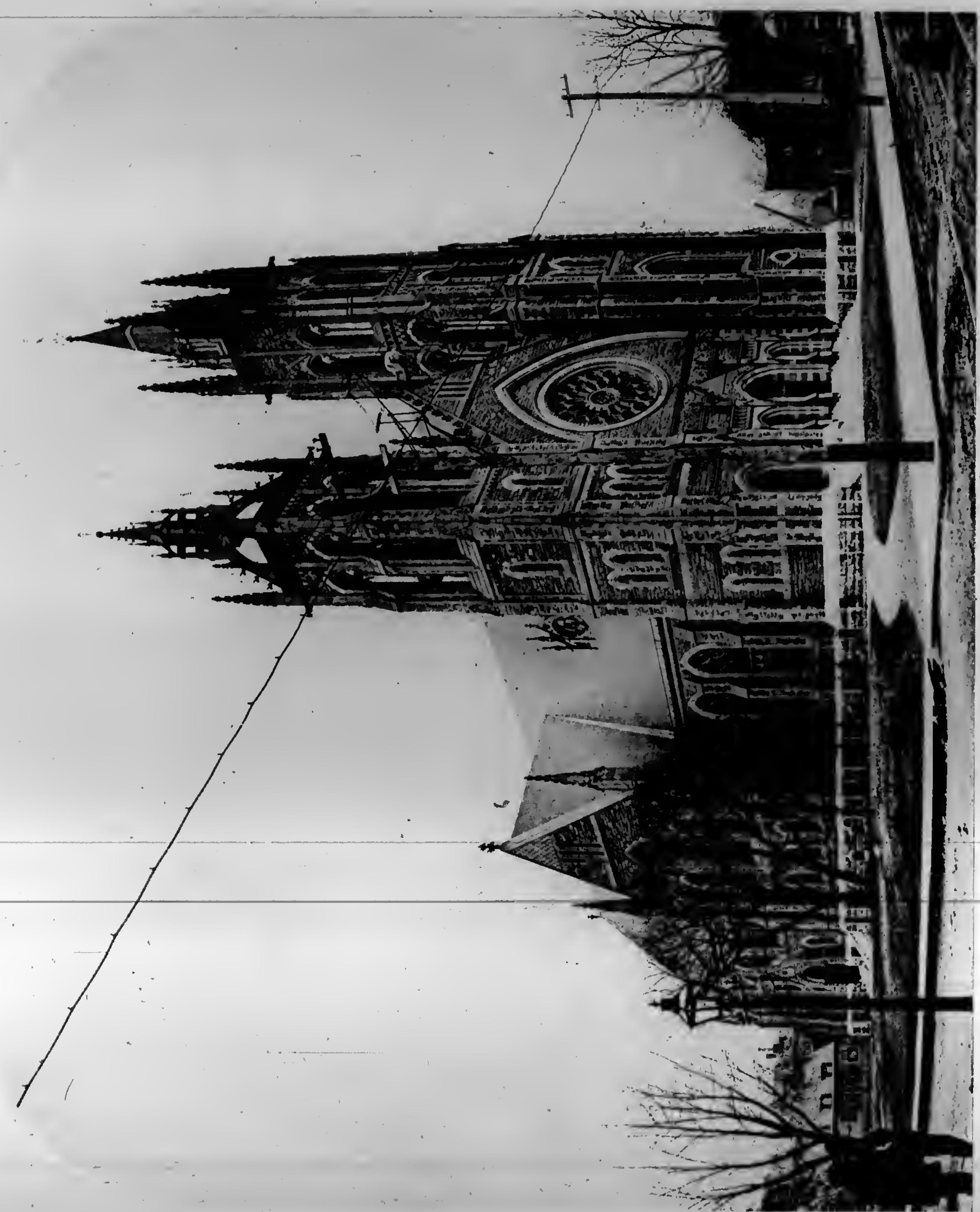
Allow me to say in conclusion: opalescent glass is undoubtedly a fascinating medium. It possesses a kind of hypnotizing influence, not always soothing, but even in its most fantastic vagaries there is a certain charm about it which one can scarcely escape.

The question is, "Is it the true principle?" Let us consult our forefathers!

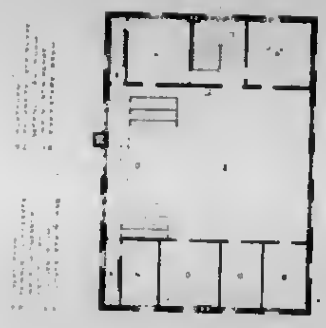


DETAILS OF MAIN IRON AND MARBLE STAIR-CASE, NEW CITY BUILDINGS, TORONTO.
E. J. LENNOX, ARCHITECT.

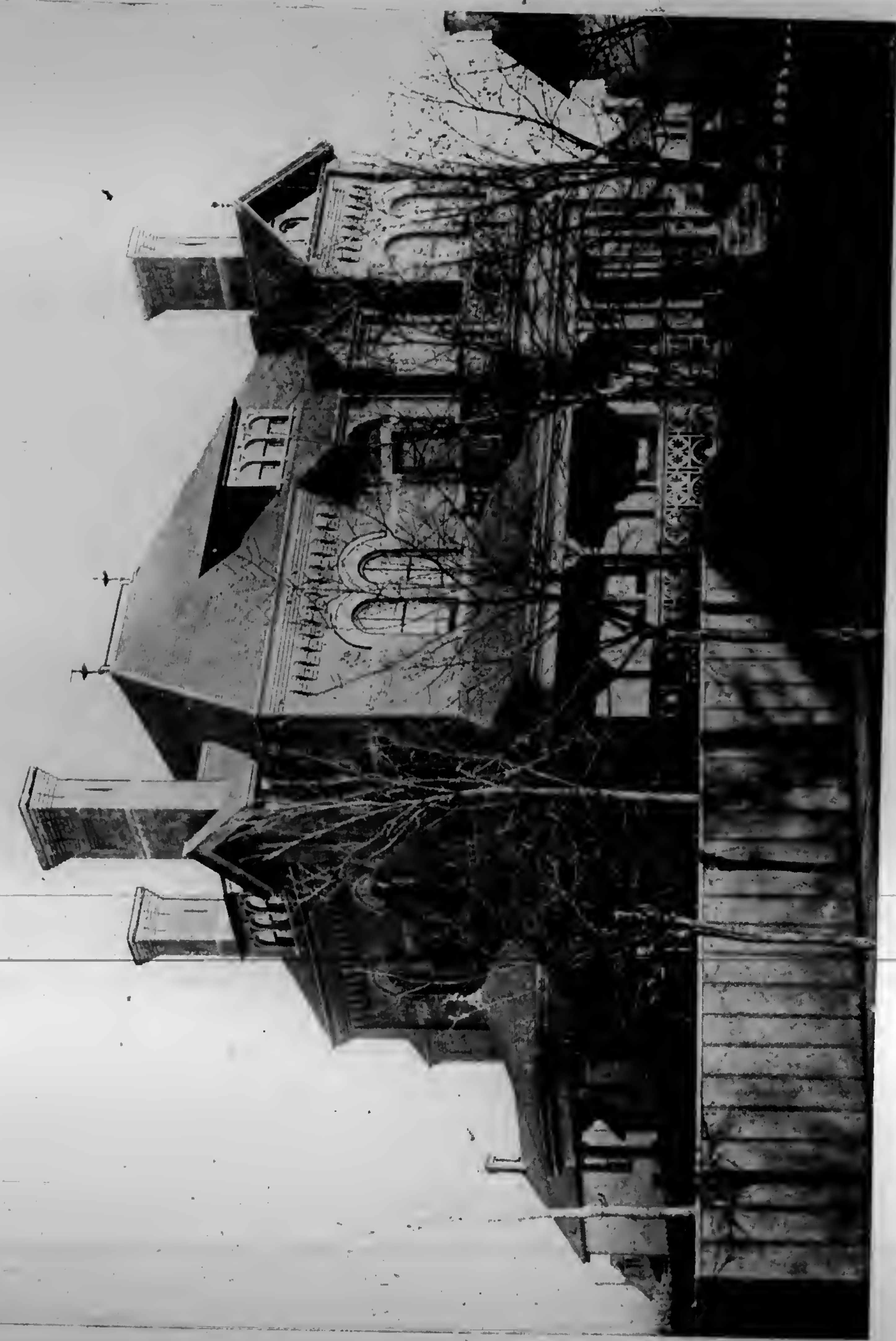
HAMMERED LEAF PANEL FOR STAIRCASE, NEW CITY BUILDINGS, TORONTO.
(From Photo.)



ST. JAMES' METHODIST CHURCH, MONTREAL.
A. F. DUNLOP, ARCHITECT.



COURT HOUSE, PORTAGE LA PRAIRIE, MAN.
GEORGE BROWNE, ARCHITECT.



RESIDENCE OF HON. HUGH JOHN MACDONALD, WINNIPEG, MAN.
CHAS. H. WHEELER, ARCHITECT.

THE MOLSONS BANK (ORIGINALLY RESIDENCE OF MR. CAWTHRA), TORONTO.
JOSEPH SHEARD, ARCHITECT.

TRINITY CHURCH, TRINITY SQUARE, TORONTO.
HENRY C. LANE, ARCHITECT.

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Safe Building.

EVEN the terrible calamity at London has not taught the average man common sense. From the papers we find that in several instances the advice of incompetent parties has been asked as to the safety of public buildings. Every man who calls himself a builder or an architect is not a safe or reliable authority upon construction. The Ontario Association of Architects have been doing their utmost to obtain from the Ontario Legislature such changes in their Act as would to some extent protect the public against the possibility of such accidents as the London disaster. The infrequency of accidents was quoted to prove that there was no necessity to protect the public against incompetency and recklessness. Those who had not been directly affected by the results of an accident could not remember that there had ever been any accidents. Accidents do occur, however, but unless they are accompanied by a great loss of life, they are very soon forgotten. An accident which could have been prevented by ordinary intelligence or care is nothing more or less than a crime. The London disaster was from all appearances due to an extreme lack of constructional knowledge, or criminal carelessness or neglect.

The Engineers' Strike.

To those who have closely watched the course of events it has long been apparent that the ever-increasing demands of organized labor would some day bring about a gigantic struggle, which would once for all decide the resources of employers and employees. The battle has just been fought in Great Britain, and has proved a Waterloo for trades unionism. The right of employers to regulate the conduct of their own business has been established. The cost of the prolonged struggle is enormous. The direct loss to the strikers is placed at upwards of $5,000,000. When to this is added loss of employment due to the transfer of orders from British to foreign manufacturers, it will be seen that the struggle has proven disastrous to those who were instrumental in bringing it about. The trade of the nation has been seriously disturbed, and it is feared that a portion of it has been driven into the hands of other nations, never to return. It is to be hoped that the hard feelings engendered by this great struggle will now be allowed to die out, and that a spirit of chivalry will characterize the victors in their dealings with the vanquished. The interests of employers and employees

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are identical. When capital on the one hand or labor on the other becomes unreasonable in its demands, and refuses to be guided by principles of justice, mutual injury is the result.

A Market for Roofing Slates.

APPLICATION was recently made to the American Consul at Frankfort, Germany, for advice as to how best to form connections with manufacturers of roofing slates in the United States. The German production of roofing slates being much below the requirements, there is said to be a good market in that country for American slates. Several shipments are reported to have been made recently to this market. The attention of Canadian slate-manufacturers is called to this matter.

British Columbia Lien Laws.

THE lien laws of British Columbia provide that unless there is an agreement to the contrary, every contractor, subcontractor and laborer has a lien for work and labor, limited in amount to the sum actually owing to the person entitled to the lien. Lien expires unless registered within twenty-one days after completion of work. If lien is on mortgaged premises, it is prior to mortgage against increase of value of mortgaged premises by reason of such work or improvement, but not further, unless work is done at request of mortgagee in writing.

Tests of Canadian Building Materials.

THE Ontario Association of Architects have decided to petition the Ontario government to grant a sum of money to defray the cost of making scientific tests at the School of Practical Science, Toronto, of the various native woods adapted to building requirements. The series of tests of Canadian building stones made a few years ago under the direction and at the expense of the association, have proven to be highly valuable, so much so that they have taken the place of reference tables and books formerly employed by architects in their practice. The authorities of the School of Science have also conducted tests of native brick, concrete and cement, so that the qualities of these materials are in a measure understood. No adequate tests have yet been made, however, of native building timber. In view of the extent to which wood is employed for supports in buildings, it is most important that the strength and physical characteristics of the various woods employed should be well understood, in order that the requisite factor of safety may be used. Prof. Fernow, chief of the department of forestry of the United States has for several years been engaged on a series of highly scientific timber tests. It is not expected that anything approaching in exhaustiveness these tests can be attempted in Canada, but there is great need that something be done in this direction on a modest scale in the manner proposed.

The Ontario Association of Architects.

WE publish in this number several interesting papers presented at the recent annual convention of the O. A. A., with the discussions thereupon. Notwithstanding that the attendance was small, the proceedings were of a most interesting and instructive character and lacked nothing but the enthusiasm of numbers. It is to be regretted that a larger number of the members of the profession residing in towns and cities outside Toronto do not participate in the proceedings of these annual conventions. No doubt the prevailing hard times have induced many members to remain at home, who under more favorable conditions would have been pleased to have contributed by their presence and counsel to the interest of the occasion. We would again remind members of the profession and of the association throughout the province that if they cannot make it convenient to attend the meetings and personally take part in the deliberations thereat, these pages are always at their disposal for an expression of opinion regarding the objects which the O. A. A. is endeavoring to promote, or any other matters relating to the advancement of architecture. So far as the O. A. A. is concerned we have no doubt the executive will welcome from any member of the profession suggestions as to the means by which the organization can be made most helpful to the profession in this province, and the interests of architecture promoted. In order to avoid a division of interest and effort the Toronto Architectural Guild has been disbanded and the energy of its members transferred to the Toronto Chapter of Architects. This step should have the desired effect not only of strengthening the Chapter, but also the O. A. A., with which it is in affiliation. In our Montreal correspondence is printed in full the bill passed at the last session of the Quebec legislature amending the Act of Incorporation of the Province of Quebec Association of Architects. This bill restricts the use of the title "architect" to persons who shall register under the act. After a period of six months no person will be permitted to call himself an architect who shall not thus be registered. This legislation exactly corresponds to that which the O. A. A. have endeavored to have placed on the statute books of this province, as well as to the act recently passed by the legislature of Illinois. In view of the precedents thus established, and the apparent necessity for a standard of qualification for the practice of architecture, as exemplified by the recent terrible disaster at London, Ont., it is difficult to understand on what ground the legislature of Ontario can longer refuse to grant the desired amendments to the Ontario Architects' Act. We trust the O. A. A. will feel encouraged by the success which has been achieved by their confreres of Quebec, to renew their efforts to obtain at the next session of the legislature amendments to the existing act corresponding to those which have been granted elsewhere, under which the public will have the assurance that persons engaged in the practice of architecture are possessed of the requisite knowledge to enable them to erect buildings which will not by reason of insufficient strength or imperfect sanitary arrangement endanger the health and lives of those who may occupy them.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MONTREAL BUILDERS' EXCHANGE.

THE Montreal Builders' Exchange has been pleased to appoint the CANADIAN ARCHITECT AND BUILDER its official paper. This is an honor which which we highly esteem. It is gratifying to learn that the membership of the Exchange is increasing rapidly, and has already reached the hundred mark.

AMENDMENTS TO THE QUEBEC ARCHITECTS' ACT.

AT the recent session of the Legislature of the Province of Quebec a Bill, No. 87, was passed, making several amendments to the Act of Incorporation of the Province of Quebec Association of Architects, chief among which is one which restricts the use of the title Architect to persons who shall register under the Act.

The following are the provisions of the Bill which was assented to on January 15th:—

1. Section 5 of the act 54 Victoria, chapter 59, is amended by replacing the words: "a secretary-treasurer," in the third line, by the words: "a secretary and a treasurer."

2. The second clause of section 7 of the said act is replaced by the following:

"Any person who had attended an architect's office during four years, at the time of the coming into force of this act shall be entitled to be registered as a member of the association by observing the above formalities."

3. The netice that the organization of the council of the association of architects of the Province of Quebec is completed shall be published without delay after the sanctioning of this act, in the Quebec Official Gazette, and the delay of six months, mentioned in section 7 of the 54 Victoria, chapter 59, shall be computed from such publication.

4. Section 13 of the said act is replaced by the following:

"13. After the expiration of six months from the publication of the notice of the organization of the council of the said association, no person can take or make use of the name of architect, either singly or in connection with any other word, name, title or designation, giving it to be understood that he is an architect under this act, unless he is registered under this act as a member of the said association.

Any person who, after the time above mentioned, not being registered as a member of the said association, takes or makes use of any such name, title or designation, as above mentioned, shall be liable, upon summary conviction, to a fine not exceeding twenty-five dollars for the first offence, and not exceeding one hundred dollars for every subsequent offence."

3. This act shall come into force on the day of its sanction.

THE LONDON BUILDING DISASTER.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Without the least idea of placing the responsibility of the London, Ont., accident at the City Hall on anyone, which might be as unjust as to saddle a surgeon or physician or dentist with killing his patient, or an apothecary for giving poison by mistake, it behooves me, as a member and past-president of the P. Q. Association of Architects, or as a member of the Can. Soc. C.E., to reduce the thing to calculation and let the result be a most instructive lesson to both professions and to builders in general, so that, if possible, present structures be examined and strengthened where necessary, or the components of new structures made such that similar accidents be impossible or improbable in the future.

From the data I possess and some of which you were kind enough to hand me, and from a plan of the room where the accident happened, giving lengths, breadths, depths and distances apart of joists, beams, etc., I compute the dead weight of the whole to have been .... 13,845 lbs.
including joists, flooring, ceiling, deafening, mortar and supporting sheet iron.
Taking the greatest assumed number of persons in the room to have been 300, at 150 lbs. .... 45,000 lbs.

Together .... 58,845 lbs.
At centre—say ½ .... 29,422 lbs.
or 14.7 tons.

Thus the incriminated beam broke under this weight.

Now the strength of beam, made up though it was of four beams 3" × 14" spiked together, may be assured, if well bound together, equal to that of a solid beam of same size, or of 12" x 14". Taking Trautwine's 450 lbs. as the breaking weight of an average pine bar of 1" x 1" x 1', we have for the breaking weight of our beam

$$450 \text{ lbs.} \times \frac{b \times d^2}{b} \text{ or } 450 \text{ lbs.} \times \frac{12 \times 14^2}{21} \text{ or } 450 \times \frac{12 \times 196}{21}$$

or $450 \times \frac{2352}{21} = 450$ lbs. x 112 times = 50,406 lbs., say 25 tons.

Therefore, had the beam been sound it probably would have stood the test, but there were knots in two of the four component pieces, and the beam broke at one of these knots; and that the knot was a bad one is evidenced by the fact of it being a dry one, since it was found fallen out of the beam. Witness Broadbent thinks these knots weakened the beam one-third, and this is a pretty shrewd guess—unless arrived at by calculation of size, or, rather, depth or height, of knot, and taking into consideration its position in the beam as to whether at centre of depth thereof or at or near top or bottom of beam.

County Engineer Talbot estimates the weakening of beam by knots at only $\frac{1}{16}$, and I am not in a position, not knowing size or position of knots, to judge between these gentlemen. But if Talbot be correct, then the difference of stress must have been due, as he assumes, to the vibration caused by the stamping and jumping he alludes to. If there was no stamping or jumping adequate to much of an increase in the stress, then Broadbent's assumption of a ⅓ weakening by the knots must be reliable.

Taking then from 25 tons, strength of beam, one-third of it, to allow for weakening, we get 14⅔ tons, or just the weight under which the beam broke.

It will be noticed that no strength or resistance or support is attributed to the flooring beams, which there of course would have been had the joists been, all of them or even half of them, of a single length or stretch; but on the contrary they are all, so I am informed, or were, in half lengths, meeting or lapping a few inches on the bearing beam, and in such case, not only do they not add to the strength, but they aggravate the weight.

Now even had this beam been sound, it is seen that its total strength was but 25 tons, not 50, as Mr. Talbot says, from, evidently, forgetting to divide his distributed weight by 2 to get weight at centre. Thus, at 25 tons breaking weight, supposing it to be sound, it had only a factor of safety of 1⅔ instead of from 3 to 5, which such factor should have been, and had it been made 20" high it would then have had a factor of safety of about 3½, thus guarding against any probable eventuality; while, as it was, a column under it would have made it all right.

Without being an alarmist, but seeing the comparative frequency of such accidents here, as in the United States, it would not be amiss for municipal and other authorities to put a few dollars in the way of architects and engineers by causing them to examine and report on structures where a column or two or the the strengthening of a beam might be essential.

CHAS. BAILLAIRGE,
City Engineer, Quebec.

MONTREAL, Jan. 27th, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Having calculated the strength of the beam and the estimated actual weight on the beam at the time of the collapse, I send you the figures which (if you find correct) may be of interest to your readers:

It has been calculated, according to your article on the subject in the January number, that there were 250 persons on the floor at the time of the disaster—which seems to be on the high side, but I have taken this figure for my estimates, which are as follows;

WEIGHT (LBS.) OF BEAM.

250 persons at 130 lbs. each = 32,500 lbs.
600 sq. ft. of floor, plaster, etc., at 20 lbs. = 12,000 "
44,500 "

Half this amount will have been borne by the beam, viz., 22,250 lbs. or nearly 75 lbs. to the sq. foot.

22,250 lbs.

CARRYING POWER OF BEAM.

$$\frac{b.d^2}{l} \times 3 = \text{breaking weight at middle in cwts.}$$

$$\text{that is } \frac{12 \times 14^2}{21} \times 3 = 336 \text{ cwts. or } 37{,}63. \text{ lbs.}$$

$$\text{or } \frac{336 \times 2}{5} = \frac{672}{5} \text{ or about } 134 \text{ cwts.}$$

that is, 15,008 lbs. safe load distributed with a factor of safety of 5. With 4 as a factor of safety we get 18,800 lbs.

The result of these figures shows that the beam when broken had about 22,250 lbs. weight upon it—if only persons were in the room and no other weight—and that this beam should not have had more than 18,800 lbs. upon it. However, the point is whether the beam would not have stood this weight of 22,250 lbs. if the beam had been built and set properly. There seems to have been a good deal made out of a knot in the wood, but in a built beam of 4 pieces 14 X 3 inches it seems to me as highly improbable that the knot would come in the same portion of the beam when built up and therefore should not have been weakened as much as argued. Another point, however, may be argued, whether a built up beam nailed together is as strong as a solid one of the same dimensions and what proportion one bears to the other. I should like to hear this point discussed by architects and engineers.

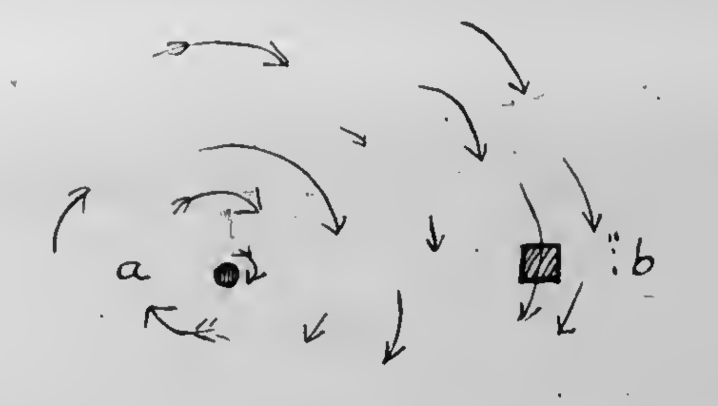
Yours very truly,
J. RAWSON GARDINER.

The contractor's ad should make a strong bid for favor.—Printer's Ink.

ELECTRICITY IN MODERN BUILDINGS.

In the construction of a certain class of building a steel framework, filled in with stone or other material, is being very largely used, and as electricity is rapidly becoming the means of distributing light and power, and to some extent, even heat, throughout the halls, corridors, offices, etc., of any building which proposes to offer all the best modern conveniences, it may be worth while to consider whether there will take place any interaction between the steel framework, considered as a conducting network of comparatively low resistance, and the electrical circuits which distribute the lighting and power currents. It is, of course, evident that such a steel framework will offer a path of comparatively low resistance to any current that may be set up in it, and it is the purpose of this article to formulate those conditions which will tend to the setting up of such currents, and their physical effect on the building materials.

Regarded as a conducting network, currents may be set up in the steel framework by either induction or by direct contact (leakage being included as a contact). The diagram shows in section an electric light wire "a" through which a current is flow-



ing, and a conductor "b" of some kind of conducting material—"a" and "b" being fairly close to each other, and more or less parallel during their length. At the instant of starting a current through "a" the whole space around "a" becomes an inductive field of rapidly increasing intensity, which will include the space surrounding "b," and this is a necessary and sufficient condition for the setting up of a current in "b," so that it will appear that actual contact is not required in order that a current may flow in "b". Similarly at the moment of stopping the current flowing through "a," a current will be induced in "b". If the current in "a," be stopped and started, or reversed in direction rapidly, or even made to wax and wane—that is, to merely fluctuate without actual reversal—currents will under all these conditions be induced in "b," and their strength will be proportional to: The conductivity of "b"; the strength of current in "a"; the rate of variation or fluctuation of the inductive field; the length of the conductor "b" that is in the inductive field—their distance apart. It is therefore conceivable that very considerable currents can be made to flow in "b" without any contact with "a." They will probably be currents of low voltage, but still capable of effecting considerable electrolytic damage. It is sufficiently obvious that contact between a conductor carrying current and a steel beam, whether it be direct mechanical contact or indirectly through a leak caused by damp, etc., will result similarly.

Suppose we have a steel frame building with a complete system of electrical distribution—for lighting, elevators, fans, heaters, etc.—it can easily be imagined that there may be set up inductively a most complicated and interlinked system of active currents in the various uprights and horizontals forming the frame, and that they may be of quite considerable magnitude. This can occur not only in the steel frame itself, but in the piping for the heating or auxiliary gas lighting services. With a direct current distribution for lighting only, these induced currents would probably have a negligible effect, as it is only at the moment of make and break that inductive action would take place, although even in such a case a direct current, though continuous in direction, will have sufficient very small fluctuations in strength (owing to the fact that the number of coils in the armature is not infinity) to keep up a continual alternating current in all the pipes and beams parallel to it and within the sphere of its influence. But in very many cases current is distributed for elevator and motor purposes, and here we find not only the small fluctuations due (as mentioned above) to the armature construction, but also that fluctuation due to the varying demands of the elevator and motor services, which, while not so rapid, will have an enormously greater amplitude, and so a much greater inductive influence. There are very many buildings, moreover, that employ an alternating current for lighting, the influence of which requires no pointing out. So that it appears that there will always be some circuits induced in such buildings, whether in the frame or the piping.

An electric current flowing in a circuit must produce one effect and may produce more. It must heat the conductor and may decompose it. The heat generated in the conductor depends on the amount of current flowing, and on the resistance offered to it, and in a circuit of varying conductivity the greatest heat will be generated at the point of greatest resistance. In a circuit composed of beams the points of junction will be those of highest resistance, and will therefore be the heating points. Just how far the expansion and contraction due to heating and cooling may be expected to work with the natural vibration to loosen the joints, is a matter that affords a very interesting field for discussion and experiment. But if it be granted that it does have the effect of so loosening them, then such loosening will tend to promote the decomposing action of the current flowing, with the assistance of whatever slight amount of moisture has condensed out of the atmosphere (or elsewhere) on the opposing faces of the loose joint. This latter action of the current is probably of greater importance than the former, as its tendency is to loosen by decomposition, and just where the utmost rigidity and permanence is desired, viz., in the foundations. The electrolytic injury would take place just at the base of a steel pillar, where the current was able to escape to earth, and the effect would be to eat away the metal, as the iron of water pipes is eaten away by the passage of railway currents. The electrolysis of gas and water pipes might be even a serious matter unless precautions be taken to minimize its effect.

While it seems impossible to so arrange as that there shall be no induced currents in framework or piping, still it is possible, and in most cases would be well, to adopt such precautions as will confine them within such small limits that they may become negligible. It would be well to thoroughly ground the entire steel structure by copper wires of large section leading from various points to the earth, and making good contact there with permanently moist soil. It would also be advisable in laying out circuits to so arrange that all those wires carrying the main current shall be as far removed as possible from any part of the structure, and as close together as insurance regulations will permit. If it be necessary for the main wires to be close to a pipe or pillar, and to run parallel to it, then they should be placed one on each side of it so as to neutralize each other's effect.

PERSONAL.

Mr. F. F. Foley, of the Stratford Bridge & Iron Co., died at Stratford, Ont., on January 24th.

Mr. George W. Gouinlock, architect, has recently removed his offices from 53 King street east to the seventh floor of the Temple building, corner Bay and Richmond streets, Toronto.

We very much regret to announce the death since our last issue of Mr. D. G. Baxter, of Stratford, Ont. For at least two years previous to his death Mr. Baxter was in such a precarious condition of health as to be unable to devote the required attention to his profession. His death was due to consumption. The late Mr. Baxter was one of the best known and most talented of the younger architects of the province. He was the first architectural student to pass the examinations of the Ontario Association of Architects, and was ever ready to declare the advantage derived from the necessary course of study.

THE "DUPLEX" BATH.

In the advertisement of the Toronto Steel Clad Bath Company appearing on back cover of our January number, the list price of the "Duplex" bath should have been given as $17, instead of $18. This price includes ash or cherry finish rim and combined overflow and waste. The Duplex is a sheet metal bath, lined with sheet copper, which is deposited directly on to the steel by the electrolytic process, by which method the electric current acts as a refining agent, this being a guarantee of purity.

A business man of Portland, Oregon, is said to have invented a paper house that should find a ready market for camping expeditions, etc., as it weighs complete but 400 lbs., and is 9 by 12 feet in size. The material of which it is built is spruce, covered by heavy building paper. It goes together in sections or panels, each being tongued and grooved so that, when put up, each part fits so closely as to be absolutely air-tight and rain-proof.

BUILDING OPERATIONS IN 1897.

The building trade of the year 1897 was not characterized by special activity. In comparison with the previous year there was but a slight gain in the value of buildings erected. Early in the season the outlook was hopeful, but it soon became evident that many new buildings which had been talked of would not be proceeded with. During the latter half of the year the general commercial improvement seemed to wield an influence upon capitalists, and as a result there were a number of buildings commenced late in the fall which are not yet completed. In Toronto some advancement was made, while in Montreal the total expenditure shows a falling off, notwithstanding that the buildings erected were greater in number. One feature of the year was the extent of building in the vicinity of mining operations. At Rat Portage alone it is estimated that there was an outlay on new buildings of three-quarters of a million dollars. The conditions prevailing in British Columbia in the west and the maritime provinces in the east call for no special comment.

Without being considered too optimistic we believe it can safely be said that the outlook for the building trades in 1898 is decidedly better than for several years past. There is a general belief that we have entered upon more prosperous times, this belief being backed up by the high price of agricultural products and the attention that is now being paid to Canada by foreign capitalists. The number of projected buildings in Toronto and other cities stands as a further evidence of this improvement. Some disastrous fires during last year will also assist in swelling the volume of building to the credit of 1898. The most noted of these were at Windsor, N. S., and Casselman, Ont. The loss in the first instance was over one million dollars.

MONTREAL.

In 1896, according to figures furnished by the Building Inspector, there were erected in Montreal 315 buildings, at an estimated value of $1,983,750. Last year, although 408 buildings were erected, the total valuation is placed at $1,414,300, showing a decrease of $569,450. Several projected buildings of considerable importance were not proceeded with. There was an increase in the number of dwellings erected and buildings remodelled, while in the suburbs of the city the season was quite active. In Westmount the total cost of new buildings was $757,950.

During the year the chemical and mining building of McGill University, the gift of Mr. W. C. McDonald, was carried to completion. It is of Italian Renaissance style, and built of limestone. The Jubilee Nurses' Home, corner Dorchester and Cadieux streets, is of pressed brick and stone, of Florentine Renaissance architecture. The architect of the above buildings is Mr. A. T. Taylor, F. R. I. B. A. St. John's Baptist church on Rachel street was remodelled and extended, at a cost of $50,000, the architect being Mr. Joseph Venne. This church has since been completely destroyed by fire. Mr. Venne also erected the church of St. Eusebe. Mr. Edward Maxwell, architect, built a large building near Phillips Square for Mr. Joyce, of brick, with bath stone trimmings; also a block on Beaver Hall Hill for Mr. McIntyre. A large school is now being completed at the corner of Rachel and Parthenon streets for the parish of St. Gregoire le Thaumaturge, of which Mr. A. Raza is architect. This building is three stories in height, with Laprairie pressed brick front. From the plans of Mr. A. Prefontaine a convent building was erected for the Sisters of Jesus and Mary, at a cost of $22,000. Several important dwellings were erected by Mr. A. C. Hutchison, architect. These include a residence on Edgehill avenue for Mr. C. Coughlin; four houses on Dorchester street, for William Rutherford & Sons, and a dwelling on Oliver avenue, Westmount, for Mr. W. K. Grafftey. A factory was also built for the Dominion Oil Cloth Company. Messrs. Wright & Son, architects, completed the Carslake Hotel for the Pallascio Estate, of stone and Don Valley pressed brick, cost $50,000. Two houses were built at Westmount for Mr. W. McDonald, cost $10,000 each. Mr. Robert Findlay, architect, built a residence on Prince Albert avenue, Westmount, for Thomas Fraser; a residence on Dorchester street, Westmount, for Mr. Henry Fry; the Sun Life Jubilee Memorial, and other buildings. The convent of the Rev. Sisters of St. Anne at St. Henri was built from the plans of Macduff & Lemieux, architects, who also designed the Moseley shoe factory at same place. The reconstruction of the east end abattoirs and the erection of Lamb's block, corner Victoria and Sherbrooke streets, were executed by Mr. W. E. Doran, architect. A fine building was erected on St. Catharines street for Mr. F. Fairman, including three stores and a music hall. The architect was Mr. A. F. Dunlop, who also erected several good dwellings.

Of the buildings erected at outside points by Montreal architects, mention might be made of the following: Gymnasium and head-master's dwelling at Bishop's College, Lennoxville, Que., Taylor & Gordon, architects; hospital at Cornwall, Ont., of brick and stone, cost $20,000, Robert Findlay, architect; General Protestant hospital at Ottawa, cost $50,000, A. C. Hutchison, architect; House of Refuge at Varennes, Que., for the Grey Sisters, cost $40,000, Joseph Venne, architect; C. P. R. station at Vancouver, B. C., now in course of erection, cost $50,000, Edward Maxwell, architect.

TORONTO, ONT.

The building permits issued by the City Commissioner of Toronto last year represent a total value of $951,130, showing a gain over 1896 of $293,962. A summary follows:

113 brick dwellings	$340,100
32 brick-front dwellings	23,550
141 alterations to dwellings	75,355
10 stores and offices	123,300
19 factories and alterations	80,770
16 warehouses and additions	71,700
Alterations to stores	46,710
8 churches and additions	85,050
1 printing office	35,000
1 brewery	10,000
1 music hall	12,000
1 abattoir	8,000
1 rink	5,000
Miscellaneous	34,595
Total, 1897	$951,130

These figures, in comparison with those of the previous year, show that there were erected last year a larger number of dwellings, factories and warehouses. Some of the best dwellings were erected on St. George street. The first permit of importance taken out last spring was for the brick warehouse of the T. Eaton Company, corner Albert and Louisa streets, which cost $19,000. The new store and office building of W. & D. Dineen followed. This was erected by Mr. F. H. Herbert, architect, at a cost of $30,000, and is a four-story white brick structure, corner Yonge and Temperance streets. Under the superintendence of Messrs. Langley & Langley alterations were made at 112-118 King street west, for the North American Life Assurance Company; these cost $15,000. On the north-west corner of King and Yonge streets, one of the most valuable sites in the city, the Lawlor Estate erected a five-story office building, which will cost, when completed, about $50,000. The architects are Messrs. Darling & Pearson, who are also bringing to completion a three-story brick office building, corner Church and King streets, for the Toronto Railway Company, cost $19,000. Mr. E. B. Jarvis, architect, had charge of extensive improvements at the Loretto Abbey, Wellington street. These include a three-story and attic brick addition and a two-story chapel and concert hall, the whole costing upwards of $65,000. Mr. Jarvis also erected a warehouse on York street for S. F. McKinnon. Another important building which figures in the permits of 1897, but which is now under construction, is the new Telegram building, corner Bay and Melinda streets. It is a four-story brick and cut stone building, to cost $35,000, of which Mr. M. Sheard is the architect. The above list includes the buildings costing upwards of $15,000.

Since the first of this year permits have been granted for several large buildings, including an addition to the Grand Union Hotel, to cost $30,000, a brick addition to the factory of The W. Davies Co., and the new Havergal Ladies College. The School Board have also asked the City Council for an appropriation of $106,000 with which to provide increased school accommodation.

OTTAWA, ONT.

The value of the building operations in Ottawa last year is estimated at more than $600,000. The chief buildings include the Russell Theatre, cost $60,000; the C. Ross Company's building, cost $75,000; and the Sun Life Insurance Company's building, cost $35,000. Many persons availed themselves of the low price of building materials to erect dwellings for private use, for which purpose brick was used almost exclusively. A number of new buildings are in sight for 1898, and the outlook is considered good.

HAMILTON, ONT.

The list of building permits for the city of Hamilton, as furnished by Mr. John Anderson, Building Inspector, is as follows:

Description.	Value.
109 brick dwellings	$163,910
9 frame dwellings	6,600
77 alterations	41,127
35 buildings other than dwellings	151,285
225	$362,922

The total value shows a decrease of $50,000 as compared with the previous year. The principal buildings were Sun Life building, Wm. & Walter Stewart, architects, cost $40,000; Spectator building, W. P. Witton, architect, cost $35,000; Wesleyan Ladies' College, W. A. Edwards, architect, cost $15,000; sewage interception works, Wm. & Walter Stewart, architects, cost $11,000; Sawyer-Massey building, W. A. Edwards, architect, cost $7,000. Improvements are now under way at the Royal Hotel, under the supervision of W. P. Witton, architect, which will cost $30,000. The buildings erected were generally of a substantial character, the absence of speculative work being a feature of the year.

LONDON, ONT.

London experienced a quiet year in 1897, the buildings erected only representing an outlay of $260,000, which is little more than half that of the previous year. Following is a statement of permits issued:

Class.	Value.
Cottages, brick	$13,050
Other residences, brick	79,650
Stores, brick	9,327
Brick veneer buildings	44,225
Cottages, frame	7,520
Other residences, frame	2,700
Alterations and additions	20,735
1 rink	3,000
3 churches	10,200
Addition to city buildings	2,000
Matrons' home	800

There were erected more than an average number of two-story dwellings.

Architects report a good outlook for 1898. In all probability several large buildings, ranging from $50,000 to $100,000 in cost, will be erected.

GUELPH, ONT.

The sum of $100,000 represents the value of new buildings erected in Guelph. Of this amount fully $70,000 was spent on new dwellings. No important buildings enter into the year's calculations. As a result of the building of the street railway, more dwellings are being erected in the outlying districts.

KINGSTON, ONT.

In Kingston residences were erected to the value of $82,000, business places, $86,000, and convents, $40,000. A new chapel for the House of Providence, additions to Notre Dame Convent and Hotel Dieu hospital, and an elevator were among the most important structures. There are in prospect for this year a drill hall, rolling mills, and another elevator.

QUEBEC.

Building in Quebec last year shows an increase of about 25 per cent. in comparison with the previous year. There was erected for the Quebec Railway Company large car stables and offices, 175 x 115 ft., and 65 ft. high, of which H. Staveley was architect. The other buildings included 37 residences and 7 factories, hotels, etc. In the towns and villages adjacent to Quebec building was quite active. Building materials were slightly higher than in 1896, but labor was about 10 per cent. cheaper.

HALIFAX, N. S.

In Halifax there were erected a larger number of buildings of small cost, the total value being given as $650,000. This includes 140 residential and 24 business buildings. Of these 159 were wood and 5 brick. The principal were: Exhibition building, Elliott & Hopson, architects, cost $100,000; Clayton & Son's business house, J. C. Dumaresq, architect, cost $12,000; Outhit & Hamilton's business premises, Henry Birch, architect, cost $12,000. Several new blocks are talked of.

WINNIPEG, MAN.

Notwithstanding the bright prospects in the spring of 1897, the total value of buildings erected in Winnipeg did not exceed $250,000. On street improvements there were spent several hundred thousand dollars, which created a large demand for unskilled labor. Frame buildings on stone foundations predominated. Mention might be made of the remodelling of the Winnipeg theatre, cost $20,000; Ashdown's residence, cost $15,000; Joseph Maw & Co.'s warehouse, cost $15,000; and N. Bawlf's residence, cost $14,000. Building materials were from 5 to 15 per cent. lower in price. Present indications show a marked improvement. Plans for a number of new buildings of a substantial character are being prepared by the various city architects. Capitalists are showing more confidence, and there is a strong likelihood of a prosperous season. It is hoped that as times improve the policy of taking contracts below cost which has been followed in the past by contractors, will be superseded by more businesslike methods.

BRITISH COLUMBIA CITIES.

At Victoria the operations of the year included the competion and occupation of the new Parliament Buildings; the practical completion of the new Post Office; the erection of the new Bank of Montreal, Colonist office and St. Joseph's hospital. Smaller buildings bring the total up to $334,800 as compared with $500,000 for the previous year.

The provincial hospital was the largest building erected at New Westminster, cost $20,000. Two salmon canneries represent an outlay of $26,000, which, with residences, brings the total up to $150,000, this being a slight gain.

OTHER PLACES.

In the vicinity of Rat Portage, Ont., it is estimated that the improvements carried out reach in value $750,000. At Berlin the expenditure was $160,000, including G.T.R. station, $11,000; at Smith's Falls, Ont., $100,000; Portage la Prairie, Man., $100,000, including Home for Incurables, Mr. Silverthorne, architect, cost $14,000, and Presbyterian church, H. Griffith, architect, cost $18,000; Brantford, Ont., $75,000; Goderich, Ont., $100,000; Charlottetown, P.E.I., $223,000, including pork packing establishment, $100,000 and R. C. cathedral, $93,000; Collingwood, Ont., $20,000; St. Catharines, Ont., $25,000; Barrie, Ont., $37,000; St. Thomas, Ont., $75,000; Peterboro', Ont., $50,000; Newmarket, Ont, $10,000; Leamington, Ont., $50,000; Waterloo, Ont., $53,000; Moose Jaw, N.W.T., $53,000; Brandon, Man., $20,000. At many of the above points the year has commenced well, there being more prospective building than for several seasons past.

Mr. H. G. Phillips, architect, of Sarnia, died in that city a fortnight ago. His death occurred in the new hospital recently erected from his designs.

ILLUSTRATIONS.

OFFICE BUILDING, ST. THOMAS—EVAN T. MACDONALD, ARCHITECT.

RESIDENCE FOR MR. J. AULD, MAGREGOR STREET, MONTREAL, QUE. —A. F. DUNLOP, ARCHITECT.

ILLUSTRATIONS ACCOMPANYING PAPER BY MR. EDMUND BURKE, ON "TWO QUESTIONS IN CONNECTION WITH STEEL CONSTRUCTIONS IN BUILDINGS," IN THIS NUMBER.

MAIN DOORWAY OF NEW BUILDING FOR THE MERCHANTS' BANK OF CANADA, AT TRURO, NOVA SCOTIA—ELLIOTT & HOPSON, ARCHITECTS.

RESIDENCES FOR T. N. AND S. B. JAMIESON, CHICAGO, ILL.—DWEN & WHITE, ARCHITECTS.

Fronts of grey granite, with gables, verandah and tower roofs of red tiles; verandah and vestibule floors of mosaic; metal work of copper, and brick walls of red pressed bricks; hot water heating with natural gas furnace; electric lights, gas and nickel-plated plumbing throughout. Finish in large house: Parlor, sitting room and den of cherry; reception hall and dining room in quarter sawed oak; bedrooms in bird's eye maple, curly birch and quarter sawed oak. Finish in smaller house: Parlors in selected curly birch; dining room in mahogany; bedrooms in sycamore, birch and quarter-sawed oak; floors throughout of quarter sawed oak; mantels, hall-trees, consoles, etc. Each closet is so arranged that opening the door lights an incandescent bulb inside automatically, and which goes out when door is closed.

MR. S. H. TOWNSEND,
President Ontario Association of Architects.

MR. S. H. TOWNSEND.

THE portrait appearing on this page is an excellent likeness of Mr. S. H. Townsend, the new president of the Ontario Association of Architects. Mr. Townsend was one of the founders and original promoters of the O. A. A. For several years immediately following the formation of the Association he discharged the duties of secretary and treasurer in a capable manner. When on the passing of the Ontario Architects' Act the office of Registrar was established and became a salaried position, Mr. Townsend resigned and took a seat on the Council, in which capacity also he gave valuable aid to the organization. It will thus be seen that he is deserving of the honor which has just been conferred upon him, and is well qualified by education, experience and energy to occupy the office with credit to himself and advantage to the Association.

FITTINGS OF OLD ST. ANDREW'S CHURCH.

ENQUIRY was recently made through the Toronto Telegram for the whereabouts of the interior fittings of Old St. Andrew's church, which, until twenty years ago stood at the south-west corner of Church and Adelaide streets. The enquiry states that when the building was demolished the internal fittings were sold with the building. The fine walnut pulpit, with its sounding board, the quaint colonial handrail of the curved staircase leading to the pulpit, the unique sounding board, surmounted by its Scotch thistle in brass, the pretty communion table were all, it is believed, either sold by the contractor to other purchasers, or broken up for kindling wood. A history of the old church, with a compilation of the records of St. Andrew's church, King street west, is to be written, and with a desire to give in connection therewith some picture recollections of the old church, enquiry is made for any one who knows where the old pulpit went.

Successful advertising is the art of telling the public the truth about your business.

THE LONDON BUILDING DISASTER.

IN the London disaster there was a terrible loss of life, and it is our purpose to determine as nearly as possible the cause or causes resulting in the disaster. We have in this case a large public hall crowded with people who are in a somewhat excited condition, and as a result inclined to crowd together around a central point, which was, in this instance, the platform. The hall was 45'.0 wide by 72'.0 long, with the platform placed nearly in the centre of one of the end walls. A portion of the floor of the hall in one of the corners gave way and precipitated those upon it onto the floor below. The size of the floor which gave way was 22'.0" × 28'.0", and extended across the hall from one of the side walls. The platform was 16'.0" wide by 7'.0" deep, and 14'.9" × 7'.0" of it was over the portion which gave way. A beam having a span of 21'.0" supported the centre of the space which gave way. The load which was on the beam was that due to the weight of the material in the floor and platform and the weight of the people upon the floor and platform of a space 21'.0" × 14'.0", of which the platform occupied 7'.9" × 6'.6". The total area of floor bearing upon the beam is 294 sq. ft., of which the platform takes up 50 sq. ft. The weight of the floor is close upon 25 lbs. per sq. foot, and of the platform 10 lbs., which would give a dead load, including the weight of beam, of 8,425 lbs. If we allow that the floor should be calculated to carry 100 lbs. per sq. foot, we have a live load of 29,400 lbs., or a total load of 37,825 lbs., upon the 12" × 14" beam.

It is somewhat difficult to arrive with any certainty at the live load. The statement has been made that there were 250 persons upon the portion of the floor which gave way. If we allow the average weight per person to be 135 lbs., we have a total live load of 33,750 lbs. over the entire space which gave way, or a live load of 16,875 lbs. thrown upon the beam. Two hundred and fifty persons on a floor span of 22'.0" × 28'.0" would be equal to one person to every 2.46 sq. ft., which cannot be considered as close crowding if all were standing. From all accounts the crowding was in front of the platform and over the beam which gave way, and it is probable that at least one hundred and fifty of the two hundred and fifty were standing on the portion of the floor supported by the beam. If such should have been the case the load upon the beam would have been 8,425 lbs. dead load and 20,250 lbs. live load, or a total load of 28,675 lbs.

The authorities are not agreed as to the probable load upon a floor of a densely packed mass of people. Hatfield, in his work on the "Theory of Transverse Strains," places the average weight of males between 20 and 50 years of age at 137.9 lbs., and that when closely packed they will occupy 15" × 20" = 300 sq. inches each = to 66 lbs. per sq. foot. An allowance of 300 sq. inches per man does not necessitate men standing very close together, for it has been shown by actual tests that two average men can be packed within the same space, which would make a load of 132 lbs. per sq. foot.

A test was made a short time ago at the School of Practical Science by Mr. Wright as to the number of men who could be crowded into a given space. Thirty-two students were crowded into a space 2'.11 13-16" × 11'.2⅝" = 33.46 sq. ft. The total weight of the thirty-two students was 4,656 lbs. = 139 lbs. per sq. foot. The average weight of the students was 145.5 lbs., a very high average. Another student could have been packed into this space, which would have made the weight per sq. foot of surface 143 lbs.

Mr. Binder B. Storey (see American Architect, April 15th, 1893) some years ago packed 58 laborers, weighing in all 8,404 lbs., into a deck house of a ship, the floor of which contained 57 sq. ft., which gave an average load on the floor of 147.4 lbs. per sq. foot. On another occasion he packed 73 men, weighing 10,948 lbs., into a hut containing 73 sq. ft., which gave an average weight of 142 lbs. per sq. foot. Prof. Kernot placed sixteen students of his Engineering class in a space of 18 sq. ft., which gave an average of 134.7 lbs. per sq. foot. The students stated that they were not as closely packed as they could have been, and that there was room for another man. The above tests go to prove that a floor may be loaded to at least 145 lbs. per sq. foot. Some authorities, on the basis of the above tests, claim that a floor should be calculated for a live load of 300 lbs. per sq. foot, to allow for jar through the movement of the crowd; but 200 lbs. should be ample, as a crowd so densely packed as to weigh 145 lbs. per sq. foot would not be able to move very much.

One of the witnesses at the inquest claimed that the failure must have been due to the jar or impact caused by the movement of the crowd, and seemed to be of the opinion that the result of such impact must be very great. There is not much data at hand to determine what this force amounts to in proportion to the actual load. Hatfield made a number of tests to determine the increase in weight due to movement of people on a floor. He used a platform scale 8'.6" × 14'0", which was accurate. Eleven men from a foundry were placed upon the scale, and when standing quietly weighed 1,535 lbs., or an average of 139.55 lbs. per man. The weight when the men were stepping without order was 1,545 lbs., or an increase of 10 lbs.; and when stepping simultaneously or in military order, 1,694 lbs., an increase of 159 lbs., or over 10%. The men were finally directed to use their utmost exertion in jumping, when the weight produced was 2,330 lbs., or an increase of 795 lbs., or about 52% increase.

According to the above experiments, the weight of 11 men standing still was 1,535 lbs., moving about indiscriminately, 1,545 lbs., marching in time 1,694 lbs., and jumping about in the most violent manner 2,330 lbs. To obtain the above result the men had to have considerable space to move about in, which would more than counterbalance the increase in weight owing to their jumping. They had a space of 119 sq. ft. in which to jump about in, which made the total load about 20 lbs. per sq. foot. It is not at all likely that when a number of people are packed as close as possible that they will be able to move about in a manner which would increase their weight more than 10%. We may therefore place the greatest weight which can be exerted upon a floor by a dense mass of people at 160 lbs. per sq. foot, which, with 25 lbs. to the sq. foot for the weight of the floor, would amount to 185 lbs. per sq. foot. As a floor to carry the above load would have to be heavier than an ordinary floor, we may place the weight per sq. foot which should be provided for at 200 lbs. This would be an ample allowance for a crowd of men standing and packed close together as in a dense crowd. Where a hall is fitted with fixed seats 125 lbs. per sq. foot would be an ample allowance, as it would be impossible to get more than half the number of people into such a hall as could be packed into one without seats.

In the London disaster we have a dense crowd around the platform. This crowd was standing practically over the 12" × 14" beam. The width of the floor which gave way was 22'.0", and of the platform 7 ft.; this would give 15 ft. in front of the platform carried by the beam. The actual load thrown upon the beam would be the number of people carried upon a space 21.0 × 14.0, of which the platform occupied 6.6 × 7.9. We will figure that the total load upon the floor of the hall was at the rate of 150 lbs. per sq. foot, and on the platform at 75 lbs. per sq. foot. This would give a total load of 40,350 lbs., as against 28,675 lbs. if we take the estimate that there were 250 people on the floor which gave way aud that 150 of them were over the beam. This load was carried by a 12 in. × 14 in. beam, built up of four pieces (3 in. × 14 in.) spiked together, but not bolted. This beam, according to Kidder, would carry safely, under a factor of safety of 4, 13,440 lbs., provided that it was composed of average material in a sound condition. The breaking load of the beam would be 53,760 lbs. If the beam was weakened by knots or dry rot 33⅓%, as claimed by one witness, the beam would break at 35,840 lbs. Another witness stated that the strength of the beam was not affected by the knots more than 10%, which would place the breaking load at 48,384 lbs. We have figured the possible and likely load upon the beam at 40,350 lbs., which we judge would be

sufficient to break a beam of the character of this one.

In this beam we have a number of very indefinite quantities. We have very little knowledge of the quality of the timber, the number, size and position of the knots, amount if any of dry rot, or the manner in which the beam was put together beyond the statement that it was spiked together. A 12 in. × 14 in. beam, composed of four 3 in. × 14 in. pieces so spiked together that the pieces could move one on another could not be as strong as a solid beam of equally good timber. A beam placed in the position of the one which broke should have been thoroughly spiked and bolted together, so that all the pieces would act together as one. It is possible that this beam for some, probably for all, the above causes, was from 30% to 50% weaker than a good sound 12 in. × 14 in. solid beam. We are aware that many consider a built-up beam stronger than a solid beam without for one moment considering the points involved. A beam built up of good, sound, perfect timber will be a stronger beam than an imperfect solid beam; and a good, sound, perfect, solid beam will be a stronger beam than the most perfectly built-up beam where the individual pieces are of inferior timber. A solid beam of perfectly clear timber is a stronger beam than a built-up beam of the same size. The only advantage in a built-up beam is when imperfect material is used, and through the use of a number of pieces the defects can be distributed throughout the beam. One large knot in a solid beam may seriously weaken the beam.

Owing to the fact that the platform prevented the crowd centreing upon the beam, the load was greater near one end than the other, and we consequently find that the beam did not break in the centre, but to one side of the centre, which we may assume was the point of concentration of the load. It may have been that there were knots at this point, but in any case it happens to be about the point where the beam would break under the load which was upon it if it were made of good, sound and perfect material. In calculating the breaking load we have allowed for an equally distributed load upon the beam, although it was not actually the case.

There are authorities which would place the breaking load of the beam much higher than Kidder, but those constants do not make a sufficient allowance for the vast difference between the perfect material with which tests are made and the average material used in building. Hatfield gives the value of white pine at 500 lbs., Hurst at 380 lbs., Trantwine 450 lbs. and Kidder 240 lbs. Kidder's constant is quite high enough for the class of material usually used by the average contractor.

The direct cause of the failure of the beam was due to its not being of sufficient strength to carry the load suddenly placed upon it. Even if the beam had been of the most perfect material and put together in the most perfect manner it was by no means of the size it should have been for the work which it had to do. The load which caused it to fail was possibly an unusual one, but while such may have been the case, it was of such a character that it should have been provided for in the construction of the beam. The factor of ignorance in this case was not by any means large enough to cover the possible load and the quality of the beam, consequently the beam failed.

We will look at the strength of this beam in another way, and in a manner which some would call practical. The beam supported a floor area 14 ft. x 21 ft., and was 12 in. wide by 14 in. deep. It actually consisted of four 3 in. x 14 in. joists. If they had been used as joists they would have been placed at 3 ft. 6 in. centres, with a span of 21 ft. in the clear. Would any practical and sane man construct the floor of a public hall having a span of 21 ft. with 3 in. x 14 in. joists at 3 ft. 6 in. centres? The common joists in the floor of the hall were 3 in. x 13 in. at 15 centres, with a span of only 14 ft. 10 in.

The verdict of the jury was "That more than ordinary care was used in its construction and selection of material . . . . and that the sad occurrence was purely accidental." The jury may be perfectly satisfied with the verdict which they gave, but there are very many who would like to have them state the reasons which induced them to arrive at the verdict they did.

What this accident should teach is that it is not safe to trust to the practical knowledge of men who have little or no training in construction and do not understand the simplest problems in mechanics. What right has any man to construct a floor or anything else on which the lives of his fellow men may depend unless he has both the practical and theoretical knowledge which will enable him to do his work intelligently and with the certainty that he has made ample provisions to cover all possibilities? In this case someone makes alterations, and in doing so uses a beam which is only one-third or one-fourth the strength that it should have been; it breaks under the load which it should have been strong enough to carry; many lives are lost, and a supposed intelligent jury calls it an accident. Accidents are bound to occur where ignorance is engaged in place of knowledge. Knowledge may seem high, ignorance may be cheap, but the cheap thing is not by any means the better, nor even the cheaper in the end. Is the loss of twenty-three lives and the suffering of the injured not too great a payment to make for the trivial saving made by the employment of ignorance? A man who knows, as he must know, that he cannot determine the strength of a beam, and yet will not hesitate to construct floors, etc., to carry his fellow men, should be made to suffer for his ignorance and presumption.

MR C. H. RUST.

WE present herewith a portrait of Mr. C. H. Rust, who was last week appointed City Engineer of Toronto. as successor to Mr. E. H. Keating. Mr. Rust has been in the city's service during the last twenty years, having entered the city engineer's department in December, 1877, as Rodman under the late Mr. Frank Shanly. In 1881 he was appointed assistant and draughtsman

MR. C. H. RUST,
City Engineer of Toronto.

by Mr. Redmond J. Brough, who was then city engineer. In 1883 he was appointed by Mr. Sproatt assistant engineer in charge of sewers, and whilst in that position constructed 150 miles of sewers at a cost of nearly three million dollars. In 1892 he was appointed deputy city engineer. Mr. Rust was elected a member of the Canadian Society of Civil Engineers in 1887, and last year was appointed a member of Council in place of the late Mr. Alan Macdougall. In view of the excellent service which Mr. Rust has rendered to the city in the past, his promotion is well deserved, while on the other hand, his thorough acquaintance with the work of his department will undoubtedly be of great value to the municipality.

TO TAKE STAINS OUT OF WOOD.—One ounce oxalic acid, 1 gill of boiling water. Wherever you touch the stain with the liquid it will remove it; if it should happen to fail try a little spirits of salts. If that won't remove it, nothing will.

TWO QUESTIONS IN CONNECTION WITH STEEL CONSTRUCTION IN BUILDINGS.*

BY EDMUND BURKE.

HAVING been invited to introduce, by a brief paper, a discussion on steel construction by this convention, I have thought it well to confine my remarks to two points which seem at the present time to call for the most care and study, viz., protection from rust and protection from high temperature, caused by fire.

The question of the protection of structural steel as used in buildings from the action of rust is one which has received too little attention in the past.

Gen. Sooy Smith is authority for the statement that rolled steel subject to moisture will be disintegrated by rust to the depth of about one inch in a century.

At this rate the life of an ordinary high building of steel frame construction exposed to the action of moisture would not exceed thirty years.

Moisture may reach the metal in mysterious and insidious ways, by leaky pipes, bad jointing of masonry or capillary attraction of the material encasing it.

It is claimed that limestone in concrete, applied to iron or steel surfaces will cause deep corrosion wherever the stone comes in contact with the metal. Mr. Buck, the engineer of the Niagara railroad suspension bridge, stated, at a recent meeting of the American Society of Civil Engineers, that in the anchorages of that bridge, the strands of the main cables were embedded in a concrete made with limestone, and wherever the spalls touched the wires the latter were badly eaten and sometimes entirely severed.

There is, of course, a difference in the nature of limestones, and some qualities may have a greater corrosive tendency than others. But in any event it shows how important it is that the greatest care should be exercised in the protection from corrosion of the structural metal work of large buildings, especially where the columns are supported on grillage footings embedded in concrete and also where the connections of columns, girders, &c., are protected from the action of heat with a like material. In such places the detection of corrosion is practically impossible.

It has been suggested, as a precaution, that where it is necessary to use limestone it would be advisable to put a layer of pure cement concrete, or an extra thick coating of asphalt around the metal, thus excluding oxygen whether free or in combination with other elements.

It is very important for the permanent exclusion of moisture from contact with the structural steel and iron of a building that it should be thoroughly coated with a reliable paint.

It is well known that there is a great range of quality in paints designed for the protection of metallic surfaces, some being practically useless as a protection from rust.

In a paper read by Mr. Max Toltz, before the Civil Engineers' Society of St. Paul, he reported results of chemical and practical tests of 22 varieties of paints. The tests discovered that some of the paints were entirely worthless as a permanent protection. One of the so called asphaltic paints when analyzed showed no asphaltum at all.

Besides the chemical examination, the paints were subjected to a systematic practical test, to ascertain their real values as anti-rust paints. For that purpose comparative tests, by painting pieces of sheet iron, tinned iron and galvanized iron, wooden boards and shallow sheet iron dishes, were carried on. The iron dishes were about 12 inches in diameter and about ½ inch deep, having a capacity of about half a pint. The scale of skin was carefully removed before painting so as to have a clean surface of iron exposed next to the paint. Two dishes were painted with each kind of paint—one of them receiving one coat, the other two coats, the first coat having dried thoroughly (for at least a week) before the second coat was applied. After the second coat had completely dried and hardened, these dishes were exposed to the so-called water-and-moisture test, in which a given amount of water is placed in the dishes and allowed to evaporate to dryness at the ordinary temperature of the room. This is repeated a number of times, till the inside of the dishes begin to show more or less rust. All dishes were carefully examined before each refilling. After most of the water has evaporated, there remains, at the junction around the edge, a thin film of water, which, in contact with the air and the carbonic and other acids in the air, acts on the paint in such a way that the iron under the paint begins to rust. The rust thus formed develops more and more after each evaporation, in some cases practically covering the whole dish in a short period. In actual practice and service the same thing will happen, the only difference being that the rust will extend under the paint and will not show as plainly as on the dish. This test is a most important and severe one for the purpose of determining in a relatively short time the weather-resisting power of a paint. If the paint is unable to resist this action of the water or moisture under these conditions, it cannot be desirable for iron and steel structures. But other qualities in the paint have to be taken into consideration in connection with this test before a correct opinion as to its merits can be formed.

The dishes painted with true asphalt varnish and with the carbon paint were refilled fourteen times. The dishes painted with one coat showed very little deterioration, while the dishes with two coats showed none at all, the paint being as elastic and tough as when first applied.

The behavior of the cheap and inferior so-called asphalt paints, applied on the surface of the dishes, was quite different. After the fifth exposure, the dishes with one coat showed considerable rust all over. Those with two coats, after the seventh exposure, showed not much better.

Quite a difference was apparent in the test of the iron-oxide paints. On the average, after the fifth exposure, a good many rust spots or specks appeared on the surfaces of the dishes painted with one coat. The dishes with two coats were refilled six times and on them rust could be easily detected with the naked eye.

The graphite paints so far examined acted much the same in comparison with one another.

All the dishes with one coat were exposed 10 times to the water test: all these graphite paints began to show a few specks of rust after the fifth evaporation, and the number gradually increased after each successive evaporation. After the tenth exposure some slight difference between them was shown, but not very much. All the dishes given two coats were exposed 13 times, and none of them showed any rust or indication of rust. The natural toughness and elasticity remained in the paint after the treatment.

Other tests with reference to exposure to heat and gases of combustion were made but are not pertinent to our discussion, having reference more especially to railroad work.

With regard to the use of red or white lead Mr. A. H. Sabin, an expert chemist, says that the chemical problems involved in the use of paints having white or red lead as pigments, are very obscure. The lead probably combines with the oil to form a soap, the acid of the oil uniting with the lead of the oxide to form a salt.

The addition of lead compounds to oil increases its rate of drying, whether heat be used to combine them or not. He questions whether this lead soap is a better binder than oxidized oil, and deems it to be very improbable that it is so even when red lead is used; white lead, he says, is notoriously converted into a crumbling soap which is washed off.

A New York architect is reported to have solved the difficulty of knowing how many coats of paint the metal work in his buildings has received by specifying the use of two colors—one to be put on before the work leaves the shops, a different color after it has been assembled, and a coat of the original color just before fireproofing is commenced, thus securing a thorough covering of every portion of the work.

Recent fires, both in Europe and America, have

* Paper read at the annual convention of the Ontario Association of Architects, Jan., 1898.

shown that the development of even a moderate amount of heat can be fatal to a structure dependent for its support on unprotected iron.

One of the most remarkable cases occurred at Vienna where the canvas of a panorama caught fire, destroying in the shortest possible space of time the roof of the building. The fire itself was quite an unimportant one, from a fireman's point of view, and yet it demonstrated what a small quantity of inflammable material may wreck and destroy a large piece of unprotected iron-work.

The entire framing of the light iron roof was found after the fire, lying, a not very distorted or dislocated mass, on the floor of the panorama building.

The effect was evidently that of a gradual yielding to the heat, and the entire roof supports appear to have simply turned inside out in their fall like an old-fashioned umbrella, the ring at the apex of the roof finding a resting place on the centre of the floor below.

A series of tests has recently been completed at Hamburg having reference to the behavior of uprights for warehouse purposes when subjected to the action of high temperatures. The conclusions reached are as follows:

1. Wrought-iron uprights, if not protected, show but little resistance at a fire, and, in fact, may be said to collapse in temperatures exceeding that of 1,100 Fah., even if this temperature is of short duration.

2. Wrought-iron uprights, if protected by concrete, in such a manner as, for instance, by filling in the kernel of girder work framing, offer a somewhat greater resistance than if entirely unprotected.

3. Wrought-iron uprights, if surrounded by non-conducting materials, i.e., "protected" in the manner so understood, show a considerably greater power of resistance than did the cases Nos. 1 and 2.

4. Cast-iron columns offer a slightly greater resistance than wrought-iron uprights, assuming that both are entirely unprotected, the collapse only taking place at temperatures above 1,400 Fah.

5. Cast-iron columns require considerable consideration regarding section and maximum load when intended for use in buildings of a dangerous character, as the time of collapse differs very materially according to the weight they are carrying during a fire, and their plan.

6. Cast-iron columns, if protected, as usually understood, by surrounding the shaft with non-conducting materials, show a greater resistance than wrought-iron uprights protected in a similar manner.

7. Wooden uprights, if unprotected, catch fire at temperature under 1100 Fah. but, though well alight, show greater resistance than unprotected wrought-iron or cast-iron uprights.

8. Wood, wrought-iron and cast-iron uprights, whether protected or unprotected, in no case give any sign of an impending collapse.

Another very interesting series of tests has lately been prosecuted in New York with a view to discover the relative value of various methods of floor and beam protection.

These tests were made at the instance of Mr. Constable, Superintendent of the Building Department of New York City. They were very carefully conducted under uniform conditions and included several methods of concrete as well as hard burned and porous tile construction. Accurate readings of temperatures and deflections were taken.

The Engineering Record says, "while this series of tests was especially designed to provide conditions thoroughly comparable with the severest conditions usually realized in actual conflagrations the circumstances governing them did not make it feasible to complete the parallelism by securing an endurance standard that would have been attained if it had been practicable to subject the constructions to repeated fires and quenchings, thus demonstrating how a structure that had endured throughout one cycle could withstand successive reapplications of fire and water after having been subjected to more or less deterioration from the first, a condition that is frequently realized by a fire breaking out anew after the firemen have once quenched it and attacked another part of the building."

The rooms in each instance were specially built, approximately 12 feet square, and a uniform load of 150 pounds to the square foot was placed on the central bay of each. In almost every case the deflection of the beams was proportionate to the completeness and thickness of their protection.

Where the soffits of the beams were protected by metal lathing and plaster or by thin slabs of concrete or tile, the deflection was the greatest and but little of the protecting material remained after the test; that which was not destroyed by the heat, was washed away or badly broken by the application of cooling water at a pressure of about 60 lbs.

In the concrete constructions the material was damaged or washed out until the embedded rods, bars or wire mesh was exposed. In the tile constructions the lower thickness invariably cracked on the application of water and many of the pieces fell down, especially the portions covering the beams.

The deflection in all but three instances ranged from about two to five inches at the time of maximum heat and in most cases the work returned to nearly its normal position after having cooled. The deflection was less than ½ inch in the best examples of beam covering, and floors having flush ceilings suffered less deflection than those where the beam construction was apparent.

In the Gustavino construction, which was of arched form from wall to wall made up of several layers of flat tiles and without steel beam supports there was a slight elevation (about ¾ inch) of the crown of the arch at the time of the highest temperature, supposed to be due to expansion of the material. The bottom lamination of tiles cracked and fell upon the application of water.

Some months after the above tests were made another was inaugurated arising out of a challenge made by Messrs. Henry Maurer & Sons, manufacturers of fire proof materials of New York to manufacturers of fire proof materials to take part in a 24 hour test. The Roeblings, using a concrete system, (Fig. 1—see illustration pages) accepted the challenge with the proviso that the tests should be conducted under conditions similar to those which governed the former ones, a 5 hour test being assumed to be sufficient to test the value of the two constructions as fire resisting material. It was further stipulated that the hard burned tile should be bought in the open market and not specially burned for the occasion.

As the conditions named by Messrs. Maurer were modified they declined to have anything to do with the test, but it was proceeded with.

The Roebling floor system consists of concrete arches sprung between floor beams on a centreing of wire mesh. The ceiling is formed of wire mesh suspended a couple of inches below the bottom flange of floor beams and heavily plastered. As the arches are of segmental form quite a large air space is formed between them and the ceiling.

This floor occupied nearly one-half the room. A corresponding space was devoted to the hollow tile floor consisting of a flat arch with concrete filling above in the usual manner. (Fig. 2—see illustration pages).

The result is thus described in the Engineering Record: "After firing for three hours, the greatest deflection of the tile arch was 3.65 inches and of the Roebling arch 1.4 inches. At this stage a large portion of the tile floor between the two tierods in the centre, representing an area about 5 x 5 feet, fell away, allowing the superimposed load to drop through into the chamber below. The temperature immediately reduced, and the test was practically at an end. The Roebling arch remained apparently intact, with shreds of the skim coat hanging to the ceiling, the brown coat remaining intact. The temperature from the time of firing rose uniformly until it reached 2,000 degrees, about an hour and a half after the fire was started. From that time on to the end of the test a temperature of 2,000 to 2,300 degrees was maintained."

The Record also remarks that "although the concrete construction came out first in the test, there is not the least indication that hollow tile is an unsuitable material for fireproof construction. On the other hand, this test, as well as others that have heretofore been made, should satisfy the Board of Examiners of New York that its discrimination against concrete construction as a fireproof material is no longer justified."

The conflagration which occurred at Pittsburg last May has furnished the latest and most interesting test of the behavior of large steel framed buildings subjected to the effects of Intense heat.

The chief damage to the frame of the Horne department store was caused by the falling of a large water tank which was supported at the top of the building upon unprotected steel beams. In falling it displaced some of the beams and ruptured the fireproofing in proximity to them which allowed the heat to warp and twist the steel work of the sections involved. But elsewhere the steel frame was practically uninjured, although in many places the tile protection of the columns and beams was displaced by heat and water. The tile floor arches, in many places also, were partially destroyed, the lower shell having fallen off. The displacement of the tile protection by the force of the water, however, did not take place till the worst of the conflagration was over, else the heat would have warped the exposed metal work to the practical destruction of the buildings.

The lessons of the Pittsburg fire are the most valuable of any which have yet occurred in steel frame buildings.

The relative value of fire proofing material was demonstrated in the following order:

1st. Terra cotta lumber or porous terra cotta.
2nd. Hard burned clay of the hollow arch type.
3rd. Concrete.

The use of these materials saved the buildings in which the various constructions were adopted.

The continuous ceiling of the top storey of the Horne department store was the most effective in preventing damage to the material it protected and suffered the least deterioration in itself.

The weak point in the girder protection of the departmetal store (Fig. 3 see illustration pages) was the method of covering the soffit, viz., a flat solid tile clamped to the web of girder with metal which was only protected by the plastering.

Many of the skewbacks had the lower portion of the outer shell broken off permitting the dovetail soffit covering of beams to drop off.

The bottom shell of the floor arches was broken and dropped off, not impairing the carrying capacity of the floors, however, as the webs were left intact.

The blocks covering columns were not properly attached to the columns and but slight concussion or expansion sufficed to throw them off.

The fire-proofing of the Horne store and office building (Fig. 4—see illustration pages) adjoining the departmental store suffered less damage than that of the store building, even where the heat was quite as intense. The material was terra cotta lumber which is burned with a considerably less admixture of sawdust than is the case with porous terra cotta.

Here, however, the same weakness at the skewbacks and soffit tiles was developed. There was practically no breaking off of the lower shell of the floor arches.

The floors and the strips to which the floors were nailed were completely burned out and the cinder concrete between the strips was reduced to ashes, thought to be on account of the unburned cinders in the composition.

In the Methodist Episcopal building, which was of concrete floor construction, (Fig. 5—see illustration pages) the test was not as severe as in the store buildings as it was divided into numerous rooms by wire lathed partitions and had not as large an exposure of windows facing the building where the fire started. The most serious damage was done in the stair well where an unprotected beam was badly warped.

The heat caused some sagging in the ceiling of the top flat which was one of suspended metallic lathing and plaster. One or two of the floors also sagged an inch or two where exposed to great heat. Portions of the partitions which were of wooden studs, metallic lath and plaster, were partially destroyed, but proved to be in a measure fire resisting.

Another interesting fire occurred in a Detroit storage warehouse. It was of skeleton construction, but the floors were of the type known as mill construction.

The columns and girders were fire proofed with terra cotta blocks and while the fire developed an intense heat on account of the nature of the contents and the wooden floors, the frame remained in place, but was sufficiently warped to displace some of the outer walls and necessitate practical reconstruction.

Some of the most experienced architects of New York are strongly of the opinion that in buildings of the office type, divided by numerous partitions, the ordinary method of protecting columns and beams is quite sufficient, while some go so far as to think that sufficient heat cannot be generated in these buildings to make it necessary to more than plaster the soffits of the beams.

The experience of the conflagration at Pittsburg, however, points to the necessity of far greater thoroughness in the case of buildings of large undivided areas filled with inflammable stocks and having large exposed window surfaces.

If such great floor spaces are indispensable, and if some means of protecting the windows is impracticable, the only way to save the steel frame from destruction in a conflagration is to so completely protect it that the enormous heat generated will not have an opportunity of penetrating the envelope till the fire has burned itself out. In other words, to so construct the building that it will resemble an enormous stove—able to withstand the consumption of its inflammable contents without injury. The duration of a fire in a building of this class has been demonstrated to be not more than an hour or two, while the destruction of the inflammable contents is much more thorough than in a building whose floors collapse quickly.

Porous terra cotta floor arches, either of solid material or having an extra thick shell, flush ceilings, and at least 2 inches of terra cotta beneath the bottom flanges of the girders, would seem to be requisite for the protection of the floors, and the substitution of porous blocks for the filling on top of the arches instead of the usual cinder concrete.

For the columns at least a thickness of three inches of porous terra cotta blocks dovetailed and fastened so that the destruction of one will not displace the rest. Casing the blocks with wire lathing well secured would add greatly to the safety of the columns and defy any amount of heat likely to be generated.

A weak point in the Horne departmental store was developed by the behaviour of the steel lintels over the large window openings. Being poorly protected they warped in several instances, destroying a portion of the walls above.

The application of water, save for the protection of adjoining premises, is undesirable after a fire has got beyond control in a fireproof building; owing to circumstances the firemen were driven from the Pittsburg stores and devoted their attention to saving surrounding property. After the buildings were somewhat cooled water was again applied. It is owing to this that the loss on the terra cotta was comparatively light, being appraised at about 5% of the value of the whole.

A new material for the protection of steel and iron from the effects of heat is being introduced in the shape of asbestic plaster. There are no details at hand with reference to any tests on full sized structures. A test was recently made in Washington on a miniature house about 4 feet high. A fierce fire was kept up for half an hour without damage to the building. Then a heavy stream of water was poured upon it without, it is said, in any way injuring or removing the plaster. It is claimed that it can be heated to red heat (1100 degrees Fahrenheit) without harming its durability, and that nails may be driven into it without causing cracks, also that it will only dinge, not break, when it is struck with a hammer, and that it is elastic, stretching with the

shrinkage or settlement of a building. It will be very interesting to observe its behavior under tests similar to those prosecuted by Mr. Constable. If it will accomplish all that is claimed for it, it should revolutionize fireproofing methods.

There are many other interesting questions in connection with steel construction, such as rivetting versus bolting, wind bracing, column and girder connections, and in connection with iron construction such as brackets on columns, column connections, etc., but I have already consumed the time allotted me in the consideration of two questions of the most vital interest in the present state of steel construction.

DISCUSSION.

Mr. Gregg having moved a vote of thanks to Mr. Burke for his very carefully prepared paper asked, have examinations been made of any of those very large steel buildings to see if corrosion has taken place to such an extent that danger is to be apprehended?

Mr. Burke: I do not know of any such examinations.

Mr. Langton: They have recently pulled down the old post office in Chicago, and the examination of the old iron work was satisfactory.

Mr. Aylsworth: That building was put up twenty-five or twenty-six years ago. It was a solid concrete foundation, not piers.

Mr. Curry: In regard to the question of fireproof construction, one great trouble about it is this—a building that may be fireproof under one set of conditions may not be under another set of conditions. An office building divided into small rooms does not require the same protection that an open building does. A storage warehouse, of all buildings, should be built with the greatest care, because one can easily imagine the heat engendered by a fire in such a building, so intense that it would destroy almost anything. Naturally an architect must take into consideration the uses a building is going to be applied to when considering the question of fireproof construction. In regard to this subject much remains to be solved in the future. Many of the tests made are not to my mind satisfactory. One man will test a material and report that he finds it all right, another may test the same material, under apparently the same conditions, and finds that it is all wrong, so, as far as I can see, the only safe course to pursue is to make a very large allowance unless you know that the test has been made by uninterested parties, and in the most careful manner. I think there is no question that concrete fire-proof construction is by no means satisfactory. The concrete in itself will not stand fire to any great degree; it is a question of how much it will stand. Certainly it will not stand the repeated action of water and fire; although advocates of that construction have put it through tests, and say it has stood the tests, I am not by any means convinced, and it will have to be subjected to more severe and better conducted tests before I am. Many of those who make tests are after all only trying to prove that something they are dealing in is superior to what other people are dealing in. We are governed by so many different conditions that all we can do is to do the best we can under each condition as it arises. In many cases you cannot put in exactly what you would desire, and in that case you must do whatever is done as well as it can possibly be done under the conditions prevailing. There is no question but that in severe fires the beams dropping below the ceilings are damaged, the terra cotta covering, or whatever it may be, generally gives way at that point. With regard to the question of rust, we have had no actual example of what has occurred, and I think it depends very considerably on the cementing material. Some limes seem to be injurious to iron, while others are not; the same with cement. Under some conditions it will deteriorate and under others it will not, so after all it is a very difficult problem. I suppose in the course of years a number of these buildings that have been erected under these conditions will have to become dilapidated and have to be pulled down, and then we will find out something as to the cause of rust and its prevention. So far as the contraction and expansion of the steel or iron that is covered up is concerned, it can not be very great, because there is not any very material change in temperature. I do not think there is anything very serious to be apprehended on that score, although Mr. Smith is trying to convince people there is. I think many of his contentions are well made, but at the same time we have to consider what has been done and govern ourselves by practical results rather than theories that are not apparently borne out by practical work.

Mr. Wickson: An architect with whom I had a conversation, who has had experience in a number of very large buildings, told me that that one thing he was determined after this to do was to have hollow tile under the soffits of all beams. He seemed to think that was a weak point, and he would have sufficient depth to get the soffit covering hollow. Mr. Burke in his paper mentioned a minimum of two inches, which would enable one to have it hollow.

The President: I think the hollow tile is quite largely used in new work now.

Mr. Corry: They have been used and defects found. It is just about the same as covering these columns.

Mr. Duff: I do not know that the question of rust has caused so much difficulty in buildings as in bridges, where the iron work is exposed to the weather. In bridges, especially near salt water, it is found that the girders, no matter how carefully you at first paint them, will rust out in a very short time, and become so thin with the action of scaling and rust that they have to be replaced in some parts. In some places, where exposed to the water dashing against them, the life of an iron bridge is only about ten years, and it is found that the rust continues to go on underneath even after a scale is formed, possibly a little more slowly than at first. As to the paint for iron work there is a difference of opinion now as to the relative merits of asphalt and linseed oil paints. I think Mr. Burke in his paper referred to iron oxide or red lead as the pigment to be used as red lead. If you wish to make beams proof against rust the best way is to specify that as soon as they are rolled they shall receive a coat of linseed oil. A great deal of damage is done before the beams have left the shops at all; the rust begins before they have passed through the mill and been punched and fitted for buildings. The red lead painting is not usually done until the beams have been punched, and in going about rolling mills I have often seen beams badly rusted before they left the shops at all, or had even been painted.

Mr. Dick: I think the most valuable feature of these discussions is the bringing out of personal experiences, and unfortunately, from that point of view, there has not been a fire in any building which I have constructed, which would enable me to know whether the precautions taken have been sufficient or otherwise. I think one of the chief lessons we can gather from Mr. Burke's excellent paper is the necessity for watching every point in fireproof construction. The strength of a chain is said to be only that of its weakest link, and if wrong in only one little point, a structure may be destroyed that was supposed to be fireproof. That applies to the protection of the main beams that come down below the ceiling. One of the greatest difficulties in fireproof construction is to make that point thoroughly safe, and it is undoubtedly safer construction to have a flat ceiling in which there is nothing for the fire to impinge upon.

Mr. Kennedy: Mr. Duff has spoken about painting the girders before they were drilled and punched; I would like to know how it would do to submerge them in paint before placing them in position. I think that is quite as cheap as painting them in the ordinary way, and by that means you are pretty sure that it is all well covered.

Mr. Gordon: I was going to remark that in the Pittsburgh fire the protection formed by the suspended ceiling, although much more lightly constructed and imperfect, seems to point to the great benefit of having air space. The difficolt point in all floor construction seems to be to keep the bottom of the large beams from the action of the fire; but if we made a flat ceiling across below the soffit of large beams, even though it were not very fire proof, simply such a ceiling as in one of these buildings, suspended and with flat tiles, it would form such an efficient protection not only to the soffit of the beam, but the whole soffit of the terra cotta on the other beam, that it would seem as if it would be impossible by any fire to cause deterioration of the floor. Then you gain the other point which is emphasized in the paper, of a flat surface, no pockets for the fire, nothing for it to catch upon. I think where extreme precaution is needed it would be the correct thing to have an air space below, forming an independent suspended ceiling below the floor. With regard to immersing instead of painting, we know that the best pipes put down for gas and water are generally dipped in tar. It strikes me that to have our constructional iron work dipped in asphaltum would certainly be more effective than painting.

Mr. Baker: The same thing has occurred to me. I do not see why a beam should not be dropped in a trough and taken out again; it would be much more rapid, and I should think cheaper than painting with a brush.

Mr. Burke: I would like, Mr. President, to make a sketch of the Roebling construction, which seems to be the ideal shape, in following up Mr. Gordon's remarks. If that could be adopted in porous terra cotta construction I think it would fulfil every requirement.

Mr. Gordon: I intended to second Mr. Gregg's motion for a vote of thanks to Mr. Burke for his paper, and beg now to do so.

The President: I am sure we are all very much obliged to Mr. Burke for his very careful paper. In regard to the immersion of beams, while it may be done and is done with cast iron, in the case of ordinary rolled steel I would have much more confidence in their being put into the oil if it could be done immediately they come from the mill. On the other hand, if it is to be done with paint after the drilling and that kind of work has been done, in the time intervening between their coming from the mill and passing through the shops for drilling they may receive more damage by rust than would be compensated for by dipping them in paint. Of course if both precautions could be taken that would perfectly protect them.

The vote of thanks to Mr. Burke was then carried with hearty applause.

USEFUL HINTS.

To Make Brown Oak Stain.—Four ounces Vandyke brown, 1 pint spirit of ammonia, 1 ounce bichromate of potash.

Ventilation depends on the volume of air that enters a room, but no more can enter than will equal the amount removed.

Red pigments embrace two distinct series of substances, the reds of inorganic origin (minerals) and red lakes, obtained from animal and vegetable colors.

To Make Black Varnish.—Four oz. white shellac, 1 pint methylated spirits, 1 oz. benzine, 1 oz. white resin, 1 oz. gum mastic, ½ oz. gum sandric, 1 oz. gas black or vegetable. Strain before using.

THE BUILDER

[This department is designed to furnish information suited to the requirements of the building trades. Readers are invited to assist in making it as helpful as possible by contributing of their experience, and by asking for particular information which they may at any time require.]

Ice at the Eaves.

One of the troubles with a flat roof in our Canadian climate is the accumulation of ice at the eaves. This is often very troublesome, as the ice rises above the level of the roof, and the water banks up and rises above the flashings, and runs down the walls on the inside, or finds some seam or leak under the covering and drops on to the ceiling below. A number of devices have been tried to prevent this accumulation, but in most cases the experiments have been failures, for if the roof at the eave can not be kept at the same temperature as the main body of the roof, or at a higher temperature, the water running down from the warmer portion will surely freeze when it reaches the colder projection during the frosty season. The accumulation, therefore, can only be prevented by keeping the whole surface of the roof at one temperature, or by some special device at the eave that will keep the flow of water at the same or a higher temperature than it acquires on the roof. There are several ways by which this result may be accomplished. The first, and in our opinion the best, is to leave a sufficient space between the ceiling joists and the rafters to prevent the heat from below affecting the roof, and having the space well ventilated in order to preserve a uniform temperature between the ceiling and roof from end to end. This prevents any thawing above the eave, and consequently there can be no flow, or if there be a thaw the flowing will be uniform—as much at the eave as elsewhere. Another method is to cut off the roof boards five or six inches short of the inside wall, and build in a good solid trough between the joists or rafters to receive the water from the upper part of the roof, and then continue the roof to the eave the same as usual. The metal forming the covering of the roof passes into the trough, forming a metal gutter, and is taken up on the lower side and continued to the eave, just as it would be if no trough was there. The water flows into this trough from the upper roof, and is conveyed from the trough to the drain by a proper leader, which passes down on the inside of the building, then through the wall to connect with whatever conveniences are provided to take the surplus water away. The theory of this device is, that the trough being placed where the heat from the rooms below can reach it, ice cannot form, and an open avenue will always be provided to admit of the free flowing of water. The theory is correct, but in practice it does not always work as is expected. If the house, shop, store or factory is vacant during a frosty term, some of the conditions are changed and troubles ensue. Another method of getting rid of the ice, and a good one, too, is to connect a steam pipe—when steam is used—with the heating system and carry it up to the underside of the roof boarding at the eve on the outside of the wall (the pipe may be boxed in), and when ice commences to accumulate, to turn a current of steam through the pipe; the result is generally satisfactory. A 1½-inch pipe is sufficiently large for the biggest roofs. The steam pipe should be so arranged that it could be cut off and turned off the heating system at will. The device is not an expensive one either to install or to operate when wanted. From thirty to sixty minutes' application of steam through the pipe will clear any eave of ice, no matter how great the accumulation may be. There are other methods more or less effective, but the three main ones are those mentioned in the foregoing.

Mortar Joints.

Mortar is used to hold the parts of a wall together, and also to prevent the fracture of the bricks or stones by insuring an even distribution of pressure notwithstanding any irregularities in their beds. Thick joints should be avoided where possible; they not only injure the appearance of the work, but, when the weight of the superincumbent walling comes upon them, the mortar is squeezed out, projects beyond the face of the wall, catches the rain and leads it into the walls, rendering the work liable to injury by frost, and the surface of a building finished with thick, coarse joints of mortar can never be made to look neat or workmanlike. In order to make neat work certain rules must be adhered to, among which are the following: In flat or flush joints the mortar must be pressed flat with the trowel and the surface of the joint made flush with the face of the brickwork. Such walls are not very ornamental, but are suitable for many buildings and for interior walls that are intended to be whitewashed or painted. Struck joints are formed by pressing back the upper portion of the joint while the mortar is moist, so as to form a sloping surface, which throws off the wet; the lower side of the joint is cut off with the trowel to a straight edge. These joints are usually struck along the lower edge. This is the joint usually made by Canadian bricklayers. Keyed joints are formed by drawing a curved iron key or jointer along the centre of the flush joint, pressing it hard, so that the mortar is driven in beyond the face of the wall; a groove of curved section is thus formed, having its surface hardened by the pressure. In some cases the moist key is dipped in ashes, which are thus rubbed into the surface of the joints. Raking and pointing consists in removing the original mortar joints to a depth of about ¾ of an inch in from the face, filling in with good mortar, and finishing the joints in one of the methods described. Pointing is not advisable for new work when it can be avoided, as the joints thus formed are not so lasting as those that are finished as the walls

are erected. During a severe frost, however, when the walls are going up, it would be impossible to strike good joints; then pointing may be resorted to during better weather. Pointing is, moreover, often resorted to when it is intended to give the work a superior appearance, and also to conceal the defects of inferior work. In repairing old work the mortar of which has become decayed, raking out and pointing become necessary. Both in old and new work, before pointing, the original mortar should be raked out with an iron hooked point, and the surface well wetted before the fresh mortar is applied. In flat joint pointing the raked joints are filled in with fine mortar and struck flat with the trowel or jointer. Tuck-pointing is chiefly employed on better-class brickwork; the joints, having been raked, are "stopped," that is, filled with mortar. This is colored or rubbed over with a soft brick until the joints and bricks are of the same color. A narrow groove is then cut along the centre of each joint, and the mortar is allowed to set. After this the groove is filled with pure white lime putty, which is caused to project so as to form a narrow white ridge, the edges of which are cut off parallel so as to have a raised white line about 1/8 of an inch wide. This work requires considerable care and skill on the part of the workman, but when well executed it causes inferior work to look as if it had been executed in the best of materials, laid in very fine joints; in carrying it out, any defects in the work, such as irregularity of joints, are corrected by smearing over the face and striking false joints, so that defective work is disguised and made to present a good appearance. Bastard tuck pointing consists in forming a ridge from 1/4 to 3/8 of an inch wide on the stopping itself, the edges being cut parallel and clean. There is no white line, the projecting part of the joint being of the same color as the remainder. Blue or black pointing is done with mortar mixed with coal ashes instead of sand. Sometimes colored mortars made for the purpose are used. Masons' or V joints project from the face of the wall with an angular V section. With good mortar they throw off the wet, but when inferior lime is used they soon become saturated and destroyed by the frost. The best joint for general purposes is the "struck joint." It is the easiest made, and is the most lasting.

PLUMBERS' MEETINGS IN MONTREAL.

REPRESENTATIVES of the Plumbers' Supply Association and of the Dominion Master Plumbers' Association met in Montreal at the beginning of the month and satisfactorily adjusted their business relations.

A meeting of the Master Plumbers' Association was subsequently held in the rooms of the Montreal Builders' Exchange, the following executive officers being in attendance: Joseph Wright, Toronto, president; W. Smith, London, Ont., vice-president; G. McKinley, Ottawa; Wm. Stephenson, Winnipeg; Joseph Lamarche, Montreal, past-president; P. J. Carroll, W. J. Hughes, representing St. John, N. B., and W. Harris, representing Halifax, N. S.

The relations between the plumbers and the supply firms were considered, as also the sanitary regulations prevailing in the various cities. In this latter connection a deputation was appointed to wait upon the proposed new local Health Board and endeavor to secure improvements in the sanitary regulations of Montreal.

It was decided that the next annual convention of the National Master Plumbers' Association shall be held at Quebec from June 29th to July 2nd. The executive will meet at 9 a. m. on June 29th and the convention will open at 2 p. m. on that date.

ANNUAL BANQUET OF THE MONTREAL ASSOCIATION.

A very pleasant evening was spent by the members and guests of the Master Plumbers Association of Montreal at the annual banquet of the association in the Queen's hotel, Montreal, on Thursday evening, Feb. 3rd, at which Mr. J. W. Harris presided. Occupying places of honor beside him were: Mr. James Wright, president of the National Association; Mr. Stevenson, of Winnipeg; Mr. Smith, of London; Mr. G. McKinley, of Ottawa, and Mr. W. Mansell, of Toronto, secretary of the National Association. There were altogether about one hundred persons present, among whom were the following: Mr. McMichael, of the James Robertson Co.; Mr. Booth, Toronto Steel Clad Bath Co.; Mr. J. M. Taylor, of the Toronto Radiator Co.; Lieut.-Col. Massey, of the Gurney-Massey Co.; Ald. Gagnon, Ald. Beausoleil, Ald. Laporte, J. P. Lamarche, T. Christie, J. McArthur, Robert J. McLaren, W. J. Wall, Z. St Aubin, E. Hebert, A. J. Martin, A. Paquin, T. Lessard, T. E. Rouillier, D. Dugas, Z. E. Martin, G. C. Denman, P. C. Ogilvie, A. S. Walker, W. Stephenson, James Simpson, J. Lecompte, J. Hoffner, Joseph Mansfield, H. H. Brosseau, Geo. Moffatt, ex-Ald. Germain, Z. Cusson, G. Lecompte, T. O'Connell, A. J. Murray, John Watson, Capt. J. H. Wynne, P. J. Canab, Alex. A. Robertson, J. A. Hughes, W. R. J. Hughes, R. J. Lockhart, Louis A. Payette, G. Pelletier, Alfred Blais, S. E. Crevier, F. Duclos, J. M. H. Robinson, C. E. Thibault, N. Simoneau, F. Hurturbise, H. A. Lamontagne, H. G. McLaren, R. D. Robins, Capt. J. Giroux, Ernest W. Thurber, James A. Sadler, T. Moll, J. M. F. Trembly, W. Skead, Jas. Addison, John Burns, J. P. McEntor, M. Beaupre and others.

Mr. F. Hortan, Secretary of the Banquet Committee, read telegrams and letters of regret from Mr. J. Doodey and Thos. Campbell, of Halifax, N. S., P. Fitzsimmons and Mr. Picard, of Quebec, Messrs. Perrier and Burton, of St. John, N. B., Mr. Foote of Boston (one of the New York delegates), H. R. Ives and Mayor Prefontaine of Montreal. The maritime province delegates were snowbound.

After justice had been done to the excellent menu the president proposed the toast "the National Association of Canada," which was ably responded to by Mr. James Wright, the President of the National Association, who said every member of the local association would find a friend in the National Association, and he had no doubt, as he had said in the afternoon, that if the roofers and steam-fitters would all affiliate with them, and take Canadian goods only, it would be of great benefit to themselves and the supply houses. He would try and do all he could to have Canadian goods used by every member of the Association, and hoped they would all see their way to deal with Canadian firms.

Mr. Smith, of London, the vice-president of the National Association made a few remarks on the same theme, and said as they expected to have a revival of home trade before long they would not require American goods in any form.

Mr. Mansell, of Toronto, Secretary of the National Association, made a few interesting remarks, and Mr. Stevenson of Winnipeg made an excellent and witty speech.

Mr. McKinley of Ottawa, hoped in the near future to see the plumbers buying their supplies from home manufacturers.

The toast "Corporation of Montreal" proposed by ex-President Lamarche, was ably responded to by Aldermen Beausoliel, Laporte and Gagnon.

Mr. Taylor gave a recitation which was received with great applause.

Mr. Dore, sanitary engineer, Montreal, also made a short speech.

The Chairman, commenting on the position of the wholesale manufacturers of Canada, said he did not see why they were not in as good a position to get the Canadian trade as the Americans; they had a good protective tariff, and suggested that the Master Plumbers form a committee to see what could be done.

Mr. J. W. Hughes, in proposing the toast "Our Guests," eulogized the wholesale hardwaremen in Canada, and also the Executive Committee of the National Plumbers Association, some of whom had travelled thousands of miles to attend the meeting.

Mr. James Simpson, President Montreal Builders' Exchange, in reply, expressed the hope that many of the plumbers of the city would see the advantage of connecting themselves with the Exchange. Appropriate replies were also made by Mr. McMichael, of the James Robertson Co., Toronto, and Mr. J. W. Taylor, of the Toronto Radiator Co. A few remarks were also made by Mr. Moore, of Boston, Mr. Saunders, of Goderich, and Mr. Anthes, of the Toronto Foundry Co.

The proceedings closed with the usual toasts to the Ladies and the Press and the singing of the National Anthem.

For the success of the Banquet credit is chiefly due to the following gentlemen comprising the Committee on Arrangements: P. C. Ogilvie, chairman; F. Hartman, secretary; J. Watson, treasurer; P. J. Carroll, Thos. Moll, Alf. Paquin, I. Lamarche.

EXECUTIVE OFFICERS.

MR. J. W. HARRIS.

Mr. J. W. Harris, third president of the Master Plumbers' Association of Montreal, was born in Buffalo, N. Y., but when about seven years of age removed to Montreal, where he has since resided. Previous to starting business on his own account he was for five years manager of the firm of Brodeur & Lessard. On the retirement of Mr. Brodeur he entered the business as a partner with Mr. Lessard. As an evidence that Mr. Hrrris thoroughly understands the plumbing and heating business it may be mentioned that he has satisfactorily conducted the steam heating plant in Laval University and fitted up several of the leading banks and other large buildings.

MR. FREDERICK HORTAN.

Mr. Frederick Horton, 1st vice-president of the Master Plumbers' Association of Montreal, was born in Yorkshire, England, and served an apprenticeship of seven years under indentures to the plumbing and heating business in one of the large contracting shops in England. On completing his term of apprenticeship he travelled for a time in England, Scotland and Wales. He then sailed for New York and lived in that city for about twelve months, thence removing to Montreal, where he considered there was a large field for plumbing and heating. After having been associated with plumbing establishments in Montreal for about three years he decided to build up a business of his own, in which he has been very successful. He was one of the most active promoters of the first plumbing association in 1887, and advocated and formed classes for the education of the apprentices to the plumbing trade held in the Council of Arts building, 96 St. Gabriel street. He was appointed instructor of these classes by the government of Quebec, jointly with the Master Plumbers' Association, and held the position for three years, when the demands of his business compelled him to resign. Mr. Hortan has carried out plumbing contracts in connection with many of the large churches, warehouses and handsome residences of the city.

MR. GEO. C. DENMAN.

Geo. C. Denman, who was by an unanimous vote elected secretary of the Montreal Plumbers' Association, was born in Birmingham, England, in the year 1855, and came with his parents to Montreal in the spring of 1858. He was educated in the British and Canadian school. For fourteen years he was in the employ of the well-known firm of Gordon & Egan, and for the past seven years has been carrying on business with his partner, under the name of Denman & Ogilvie, 279 Bleury street.

REASONABLE SUPPORTING STRENGTH OF DIFFERENT KINDS OF SOIL.*

By A. F. Wickson.

Regarding this question there is a large amount of data to be had from the text books, so I will not do more than was in the first place intended, viz., merely attempt to open this discussion. I think we shall obtain the most desirable results if members who have had difficulty in getting a good foundation will tell us just what the difficulty they experienced was, and the means they adopted to surmount it. The text books speak of the different kinds of foundations to be found, there is rock, clay, gravel and sand, the clay being marked as one of the most dangerous, as a rule, owing to the difficulty of keeping it dry. Good hard, dry clay is, as almost everyone knows, an excellent foundation, but not as good as gravel or compact sand. One thing I thought I would speak of particularly is the practice of making tests wherever one is going to build; it would almost seem as if tables and data alone were not sufficient in erecting buildings of any magnitude, and that the best thing one can do is to make careful tests. The suggestion of Mr. Kidder, who has recently written a book on this subject, is that a table with four legs, each about six inches square, should be placed on the soil, and gradually loaded with heavy weights until there are signs of settlement, carefully noting them, and having found that it is beginning to make an impression to take from one-fifth to one-half of the load as the safe carrying power. For the Capitol at Albany they erected a mast, holding the top in place by guys, and loaded weights on it, taking, I think, about fourteen inches square at a time. For the congressional library at Washington they had a moveable table with the load already on it, that was moved around the foundations making tests at short intervals, and in that way they found what it would safely carry. The strength of soil as given by Rankin is very low indeed, from 1 to 1.5 tons, but that is a great deal below the average. In Kidder's new book he puts it as follows:

BEARING POWER OF SOILS.

KIND OF MATERIAL.	Bearing Power in tons per square foot *	
	Min.	Max.
Rock, hard	25	30
Rock, soft	5	10
Clay on thick beds, always dry	4	6
Clay on thick beds, moderately dry	2	4
Clay, soft	1	2
Gravel and coarse sand, well cemented	8	10
Sand, compact and well cemented	4	6
Sand, clean dry	2	4
Quicksand, alluvial soils, etc	0.5	1

* Ira O. Baker, C. E., in Treatise on Masonry Construction.

I think if we could get any discussion from members as to how they have overcome the difficulty encountered in quicksand it would be very helpful to many of us. Here in Toronto we are very well off for foundations as most of our soil will carry from two to four tons per square foot pretty safely. One large building put up not long ago was carefully figured for two and a quarter, and in a warehouse building which I put up myself, where it was figured at three and a half there has been no trouble, so far as I have heard. In a recent experiment in France they found that clean sand carried 100 tons to the square foot quite easily. One is liable, even in Toronto, perhaps, to take it for granted that as we have pretty good soil it is not necessary to test it, or take as much pains as in some other places, but we certainly run risks in not doing so. I know of one building erected here not long ago on partially filled in ground, the foundations of which were in some places not taken far enough below the original top surface. While nothing dangerous resulted, it went down sufficiently at one corner to cause a slight crack. A little more careful testing would have prevented that. Quicksand is one of the most difficult soils to build on. I notice that in building the Boston aqueduct they had trouble with it, and tried several methods before they succeeded; putting in concrete first, it would not work, as there was a sufficient force of water to prevent it properly setting. Then they tried filling a trench quickly with two feet of good coarse gravel, pounded down, and in that way obtained a very good foundation. Made ground is also one of the most difficult bottoms to handle, the only method being, usually, to go right through to the solid earth with the masonry walls rather an expensive method, it is true, but I see no other way out of it. Not long ago there was an arbitration case here, and I know a great many of those who were on it took the view that the only way of making such ground useful for building purposes was to take piers right through the filling into the hard ground, and that meant going down, I think, between twenty-five and thirty feet, in some cases. There is just one other point that occurred to me in this connection, and that is that in building where there will be tremor one has to allow a good deal less for bearing power than in other buildings, as the shaking and vibration have the effect of causing such a building to continue sinking for a much longer time than a steady building would do.

* Introductory paper, read at the annual convention of the Ontario Association of Architects, January, 1898.

DISCUSSION.

Mr. Helliwell: A case came under my notice in the city where there was a deep ravine, the filling in of which was begun about ten years ago, and has been continued up to the present time. The filled-in portion is now quite extensive, and the owners of the land contemplate putting up buildings on it. The site is not such that very costly buildings would be erected, and the question arises, "What would be the best way to overcome the liability to settlement." The depth of the ground would be from forty to sixty feet, and I would like to hear suggestions as to what can be done in a case of that kind to put up buildings at a moderate expense.

Mr. Wickson: The only thing, I should think, would be to have the ground tested as accurately as possible, and then, if it has any bearing qualities at all, by spreading the footings the difficulty might be overcome. The difficulty about spreading the footings is that it is rather expensive, even when composed of concrete with twisted wire (one of the cheapest methods), but I do not know of any other way except to go right down to the original soil. The method I suggest might do if the filled soil had a bearing power of a ton to the foot.

Mr. Pearson: If it had a bearing power of a ton to the foot there might in course of time be a shrinkage, owing to the action of water, and I should think it might be better to pile.

Mr. Wickson: Unless the ground is saturated, it is very little good. Piles will not last in ground that is not wet, one of the fundamental principles of piling being that they must be cut off below the water level to be of any value.

Mr. Gordon: In the case referred to I would suggest building the house somewhere else.

Mr. Paull: In the city of Boston they drove down piling below the water's edge, and on that they put large flat stones across, and on that they have successfully laid their foundations and erected fine mansions.

Mr. Wickson: Mr. Paull's remarks about the houses at Boston simply support what I have just said as to cutting off the piles below the water line. In reply to the statement that a soil not carrying more than a ton to a foot is not strong enough to be built on, if the spread of your footing is only made proportionate to the weight to be carried, a bearing power of even less than a ton to the foot could be used. It is a question whether you could make a brick foundation spread sufficiently to carry the building. There is also this to consider, that filled-in ground is worse than soft ground, because you do not know what may be beneath. I do not think Mr. Helliwell has an easy task before him; to build on top of made ground at all is decidedly inadvisable.

Mr. Gray: I think Mr. Dick had some experience in building the Infants' Home, which might be valuable; it was built on an old reservoir or something of that kind.

Mr. Dick: It was built on the site of an old reservoir that had been filled in with ashes and all kinds of rubbish. It looked tolerably uniform, and was too deep for one to go down to the solid ground, and what appeared to be the cheapest way to get a foundation was to widen the footings so as to get a large bearing surface, and that was done by using two thicknesses of two-inch plank crossed. It was expected that the settlement would probably be uniform, but owing to inequality in the filling, and the the nature of the stuff used for filling, it did settle more in some places than in others. The consequence was that several cracks appeared, not sufficient to interfere with the stability of the building, but still enough to be unsightly. At the back of the main building there was a low annex, used for laundry purposes, that came partly on the filled ground and partly on the solid ground. The same precautions were taken where it extended on the filled ground as had been adopted for the main building; the plank foundation was put down, but notwithstanding that, a crack appeared on each side of the building just where the solid ground and the filled ground connected, which, of course, was just what might have been expected. The building being only one storey high, it did no harm, but it certainly looked bad. I have looked up some data or calculations I made some time ago for a chimney erected down near the Don, on what was supposed to be pretty bad soil. It turned out to be clay, and it was above the water level, and dry. The chimney was 130 feet high, above the ground, and the load was about 3,950 pounds to the square foot. Over the whole site was a bed of concrete two feet thick, then a course of heavy dimension stone, on which was begun the foundation of brick, with large wide footings, diminishing by offsets of a quarter of a brick until the width was reduced to the thickness of the wall proper. The chimney was built very rapidly; in fact, the brickwork was begun the very day the concrete was put in, but there has not been the slightest appearance of cracking, though, looking at it since, I have seen what I think is a slight settlement. There is not the slightest appearance of cracking or being out of plumb, and the settlement, so far as we could judge, was not more than half an inch.

Mr. Wickson: In building near a bank on clay, one needs to be very careful, as the water runs through the edge of the bank. Although it is rather against the reasoning in my former remarks, I might say that a row of houses was put up in Toronto a good many years ago on piles, and they are there yet; whether they have had any trouble from the piles decaying I do not know, but I know that the walls of the main houses were built on piles and the wings were built on earth, with the result that they were almost detached buildings before many months. I suppose it depends entirely on the life of the piles how long they will stand plumb.

The President: I had a case, a chimney I had to build on made ground. It was not very high, only 95 feet, and quite a large one. I made a test by driving just a few piles around it. I might say the chimney was intended to be incorporated in the building. In driving the piles I found that on one side the ground was softer than on the other. The piles drove fairly hard, and sufficient of them could have been put in to carry the chimney, but I did not want to put them in, because I thought it might not always be damp ground. I therefore extended my foundation on the soft side and made it consideraly larger than had been intended, and put in large flags. You know we generally have stone foundations in our city, and we put in a large flag foundation, and on top of the second tier of flag I put in concrete, and on that built my chimney to the height of about sixty feet without connecting the building, and let it stand for a time, five days, I think, at sixty feet. At the end of that time I found that it had not moved perceptibly, so I connected my building with it at once and went right on. I watched it very closely, and the building and chimney are almost as one. While it is not a good foundation it came out all right.

Mr. Burke: If there is danger of piles decaying in dry ground is there not equal danger of plank put in as Mr. Dick described decaying? And if the plank should decay there would be a more dangerous settlement than in the other case. I remember when I was a student with Mr. Langley he built two or three warehouses at the corner of Scott street on piles. I never noticed any cracking, but there the soil was somewhat damp, because it was down below the level of the water line.

Mr. Langton: I used paving stones three or four feet wide to carry an addition to a house resting on quicksand. The main portion of the house had a plank foundation under water, which, though it had been down twenty years was as good as ever. I cut it with a knife and it was like a new plank. I wanted, however, to carry my floor above the wet and found these 4 inch slabs of stone cost but little.

Mr. Aylsworth: Seventeen years ago I put up a block of stores three-storeys high, and the end wall on the side street happened to go right over a stream, and we did not go down any deeper than was required for ordinary foundations. The rest of the ground was pretty good sand. We put two thicknesses of plank to bear it. There was no sign of cracking about it, I suppose it has always been under water. I have not heard anything in this discussion about the effect of frost on sand foundation, as to heaving it. In the town where I put up the stores I speak of I put up a twelve-room school house, and I did not go more than eighteen inches below the surface at any part, because it was intended to terrace it high enough to counteract the influence of frost. That was on a sand foundation, and the terracing has never been done yet, although it is sixteen years ago, and yet there has never been any sign of heaving or cracking.

Mr. Wickson: It is wonderful what can be done in sandy soils in that way, but very great care has to be exercised in others. Mr. Kidder recommends very strongly in his book to batter the foundation a little bit when building on clay soil to counteract the effect of the clay heaving as it will invariably do. As to Mr. Aylsworth's experience, I would not like myself to take the chances of eighteen inches, even in sand.

Mr. Aylsworth: It seems to prove, however, that sand does no heave.

MANUFACTURES AND MATERIALS

The Owen Sound Portland Cement Co. have recently added to their manufacturing plant a Raymond Vacuum Separator.

At the works of the Ontario Sewer Pipe Co., at Mimico, a new kiln has recently been constructed which is said to be 36 feet 7 inches in diameter.

A factory is to be erected at Halifax, Nova Scotia, by J. P. Carritte, of that city, and J. W. Patterson, of Montreal, for the manufacture of tarred roofing and building paper.

A charter of incorporation has lately been granted to the R. McDougall Co., Limited, of Galt, Ont., capital $30,000, to do a general foundry business and manufacture heating and ventilating apparatus.

Germany produces annually about 13,500,000 barrels of Portland cement. About 3,000,000 barrels are exported, the remainder finding a market at home. The price at the works runs from $1.25 to $1.50 per barrel.

Messrs. Geo. W. Reed & Co., of Montreal, have published an attractive illustrated catalogue, descriptive of the advantages for heating large buildings of the Boston Hot Blast System, for which they are the sole Canadian agents.

The Odorless Crematory Closet & General Heating Co. of Hamilton, Limited, has recently been incorporated, with a capital of $24,000. The names of the promoters are: H. S. Griffin, M. D., T. J. Stewart, W. Trusdale, Hamilton, Ont.; J. Dickenson, Glanford, and W. M. German, Welland, Ont.

The suggestion has been made by Stone that quarry owners would find it profitable to add to their plant a stone crusher, and thus put themselves in a position to supply crushed stone to neighboring municipalities for use in road-making. In many parts of Canada the municipalities are taking the initiative by purchasing their own plant.

If there is one fact about advertising that is well established, it is that its effect is cumulative.

WOODEN POSTS AND BEAMS.*

By H. B. Gordon.

Owing to the lateness of the hour I shall not occupy any time in speaking on the subject I was to have spoken on, "Wooden Posts and Beams," but there is a matter I wish to bring to your notice. For years past when making calculations in regard to the strains and loads upon posts and beams we have been using Kidder and other books, written by men whose ideas have been formed upon very imperfect data. The tests made in 1882 and other tests with regard to the various woods have been very imperfect tests. You all know the element of dryness is very important in getting at the correct sustaining power of any timber, whether it be its power to support transverse strains or pressure strains. The latest authority I have consulted on the subject is I think borne out by the tests made by the Forestry Commission in the United States during the last six years. They have borne out this fact, that a dry stick is 75 per cent. stronger than a green stick, so when no idea of the amount of moisture in a stick has been recorded any test of that stick can be of little value. Another thing which I have learned recently is that even after a stick of wood is thoroughly seasoned, if exposed to moisture again it becomes as weak as a green stick, so that a stick of wood fairly seasoned il exposed again before the test, by being allowed to lie in a damp place, would be very misleading; so, as has been said by a recent author, the factor of safety in wood construction is largely a factor of ignorance; we have been placing it pretty high, just in order to cover all these unseen contingencies. Now that is a very unscientific and very wasteful way of proceeding, and it seems to me highly necessary that we should have a proper investigation of the building timbers commonly in use in Canada. I notice in the tests that have been going on during the last six years under the Forestry Commission of the United States that they have up to the present time made some six or seven thousand experiments or tests on 32 different kinds of woods, but really the only woods there that in any way compare with ours are some pine from Michigan, and some southern pine that is occasionally imported here for special work, and in limited quantities. The range of strictly Canadian building material is not touched upon. Even with those seven thousand tests there are many points they have not yet touched upon, structural points which require further experiment. There is, therefore, before any body which will take this up a very large and extended work, and an expensive work as well, and I am told that while there is a somewhat efficient testing machine here, though not so large as we would like to see, and hence not able to test some of our specimens, the great drawback now is that they have not the funds to carry out proper tests. In order to carry out the tests properly it is necessary that the wood should be selected by an expert. Then a record should be kept of the aspect in which it is grown, and the soil, the time at which cut, and a great many other things, which entail considerable expense, and that simply for the selection and preparation of the specimen. Then before the specimens are tested there should be a reduction of each specimen to a certain amount of moisture, such moisture as would ordinarily be found in the inside of a house, or in a dry place, say 12 per cent. In that way there is an immense amount of work and considerable expense necessary before we can have the proper data from which to form our calculations, and, such being the case, I have prepared a little resolution which I would like to have passed by this convention that it may be placed in the hands of a committee to present to the government:

"Whereas there exists no satisfactory compilation of the results of tests of Canadian building materials. And whereas no exhaustive or even relatively complete system of tests has been made of Canadian woods used in building. And whereas the architectural and engineering professions are thus left without accurate information about the materials they are constantly required to use. And whereas the safety of the public and economical use of our native building materials require that such tests should be made. And whereas the Ontario Legislature has emphasized the importance of this matter by providing the School of Practical Science with expensive and efficient testing apparatus. And whereas the benefit of having such apparatus is largely nullified by lack of funds to select and prepare suitable specimens and carry on a complete system of tests.

The Ontario Association of Architects in annual convention assembled respectfully petitions the Ontario Government to place at the disposal of the School of Practical Science an adequate fund for the purpose of selecting and preparing specimens of Canadian building materials and making extended tests of the same for the purpose of preparing reliable data for use in the building trades. And the convention is of opinion that a sum of not less than $5,000 should be given to institute such tests."

* Introductory paper presented at annual convention Ontario Association of Architects, Jan., 1898.

I do not think it necessary for me to further enlarge upon the necessity of these tests. The amount I have named may seem large, but it is sufficient to make preliminary tests, so that a preliminary report may be brought in, and the utility of the system of tests demonstrated. I am sure that a further grant could be obtained. In conclusion I may say that I have had much pleasure in looking over a recently published book which is very useful along this line, and I would suggest that it be got for our library. It is called "The Materials of Construction," a treatise for engineers on the strength of engineering materials, by J. B. Johnston, civil engineer, of Washington University. In it there is a deal of material not necessary for an architect, but also a great deal that is necessary and helpful.

DISCUSSION.

The President: I am sure we are all very thankful to Mr. Gordon for his remarks on this subject, and although we have not now time to discuss it I would like to see the resolution seconded and carried.

The resolution was seconded by the Registrar and carried.

Professor Galbraith: I think that if some work of the kind proposed could be systematically carried out the results would be of great benefit. Professor Johnston has had a wider experience in timber testing than any investigator in America, if not in the world. The tests carried out by him for the American government were on a very large scale. The staff and equipment employed in the work were altogether independant of Washington University. The work was not done by students nor hampered by the necessities of an educational institution. The object of his investigations was to trace as far as possible the causes of the variations in the strength of timber. The timber tests hitherto made in the School of Practical Science were on the other hand for the instruction of students and not for purposes of research. On this account they have not been published. The results of research ought undoubtedly to be given to the world. I have no intention in making these remarks to throw cold water on the proposition. At the same time I think the Association ought to understand that they are dealing with a large question. As the resolution is quite general I would suggest that it be taken to mean that we carry out such a line of tests as we may decide upon after discussion with a committee of the Association. It is quite possible that we may be able to select a line of work which will fit in with our opportunities and at the same time yield results which may repay the time, labor and money which will necessarily be spent.

The Registrar: I fully understand the value of such tests as Prof. Galbraith has in his mind, but for the ordinary purposes of the architect here they give no satisfaction. One cannot tell when he gets a stick of wood where it comes from, the conditions under which it was grown, or anything of that kind. What one wants is to pick out of any lumber yard timber free from large or loose knots, shakes or other marked structural defects such as we specify the builder must use, and ascertain at what strain it will break, and what is the margin of safety to be recommended. That is what is really and practically useful to ordinary architects not doing engineering work. But there is more than that intended in the resolution; there are certain native stones we use which are not tested by American testers. There are other stones in the country which are not yet known, and the fact of their being tested will introduce these materials. Such a test need not be published by the School as an effort of research for the finest scientific data, but by the Association as an ordinary test for architects of materials ordinarily used. I do not know whether the Association will bear me out in thinking that this is a practical test, but I think there is weakness in applying the data of very fine tests to very common material.

Professor Galbraith: What I meant was that tests of natural building materials such as wood and stone, unless made as Bauschinger and Johnson made them are almost useless. The kind of testing which Mr. Langton proposes would not, I think, be of very much value. The case is quite different with artificial building materials such as steel, iron, brick, etc. With these the processes of manufacture in general are such that the various specimens in a given class differ but little from the average. Average results in the case of stone and timber are of little value because of the great differences between them and the individual results. Sticks of timber apparently similar will sometimes differ in strength 100 per cent. Investigation to be of value should be devoted to determining the causes to which variations are due. A knowledge of these causes will enable the engineer or architect to make safe and practical specifications.

Mr. Gordon; What I had in my mind is entirely different from what Mr. Langton speaks of, although he is the seconder of the resolution. What was in my mind was that the School of Practical Science would start with say four or five of the most common and most widely used woods in Canada, and make a thorough investigation, as far as possible, and, that being done, bring in a report on those. That would so demonstrate the utility of the matter that we would easily get a further amount of money to take up other lines of building material, and it is by doing a little and doing it thoroughly it can be possible to attain greater ends.

The President: I think myself that any test made and reported as official would certainly have to be something beyond the ordinary test. I quite agree with Mr. Gordon, and I am glad Prof. Galbraith is prepared to make tests somewhat of the character of those reported by Professor Johnson, although we cannot hope to eave them so exhaustive, still we can make a start in the work,

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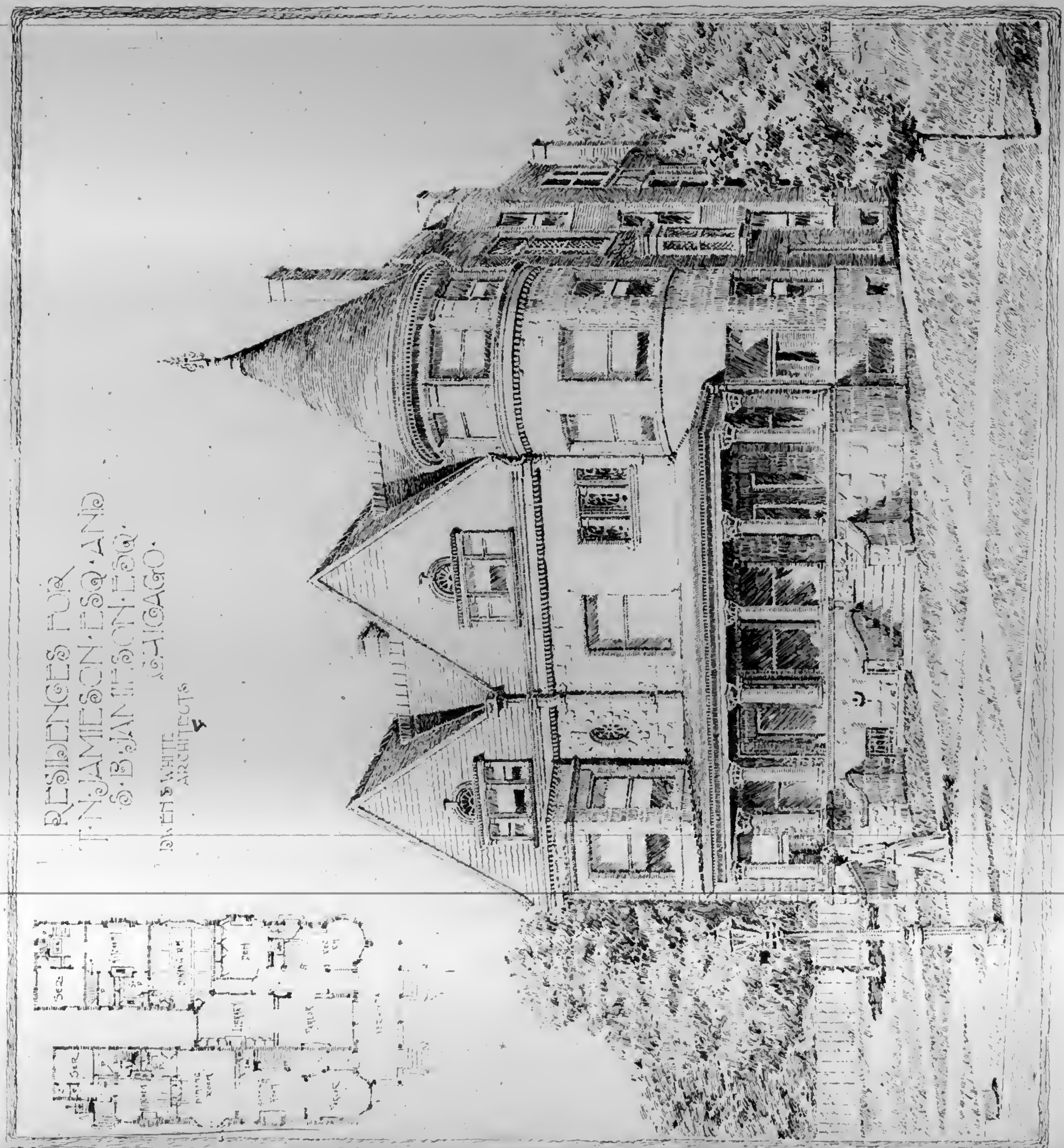

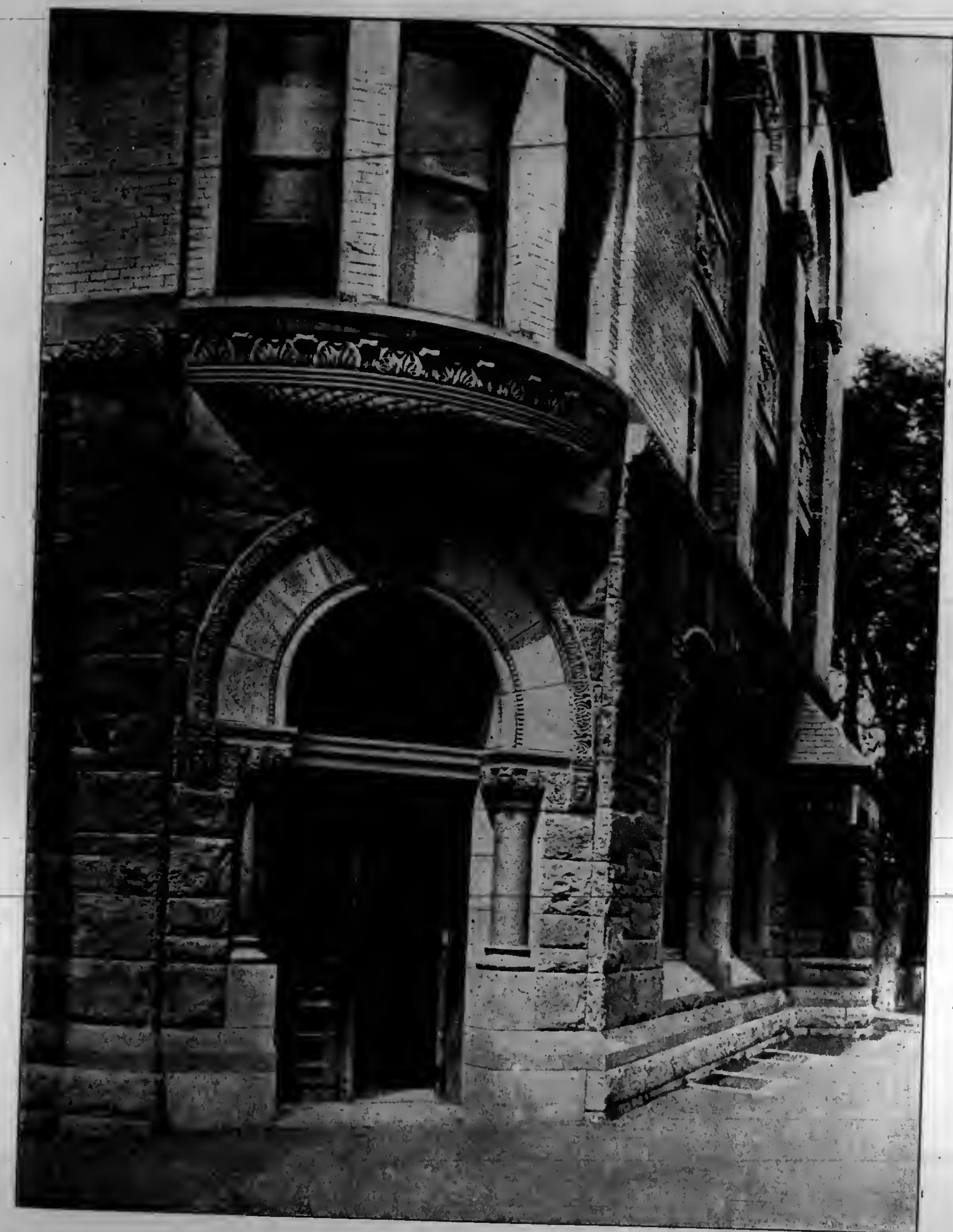

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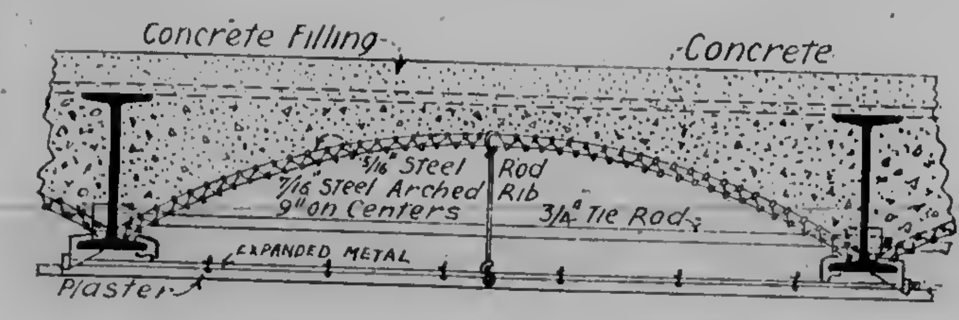


THE ROEBLING FIG. 1 SYSTEM

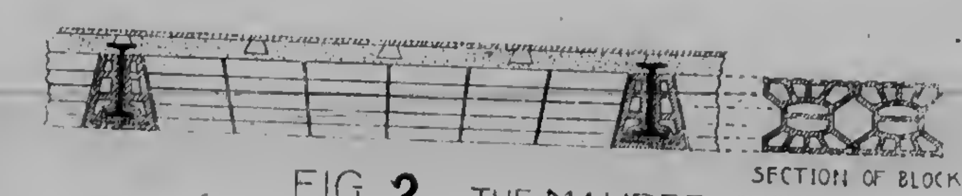


FIG. 2 THE MAURER SYSTEM

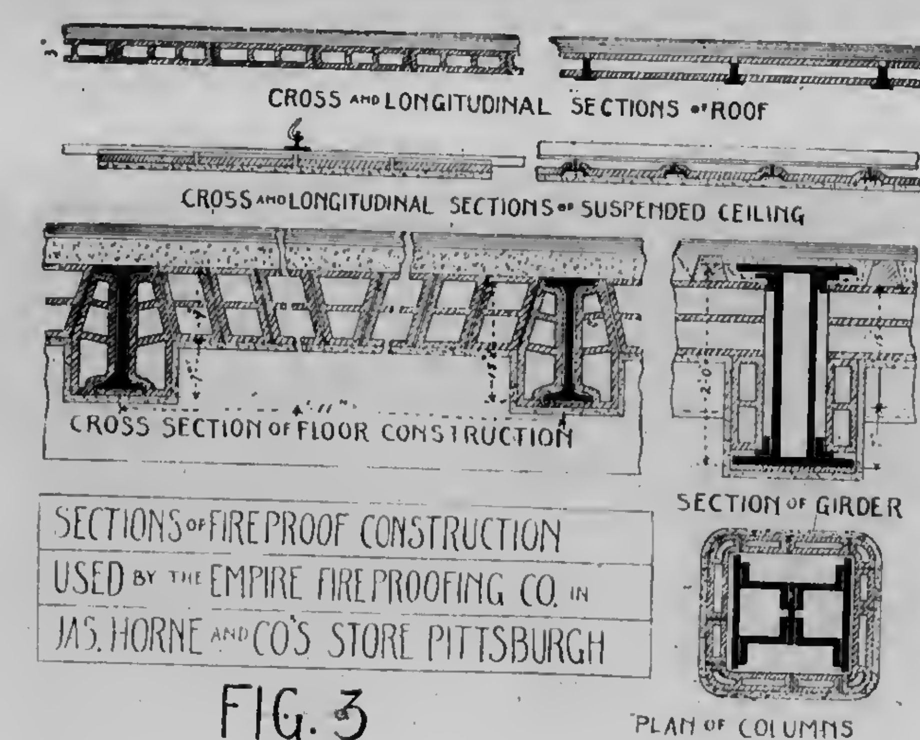


FIG. 3

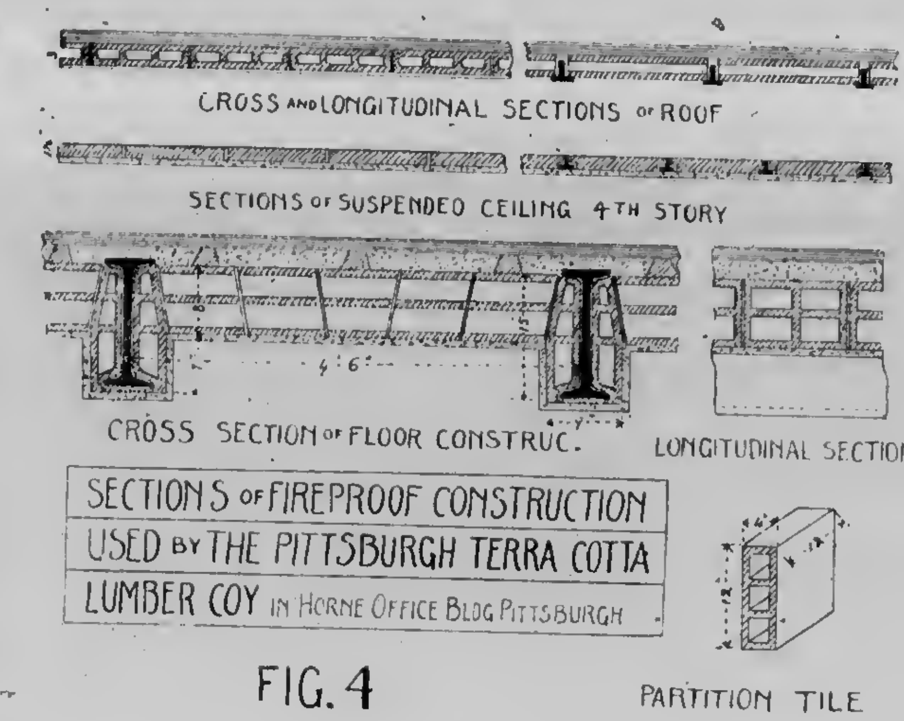
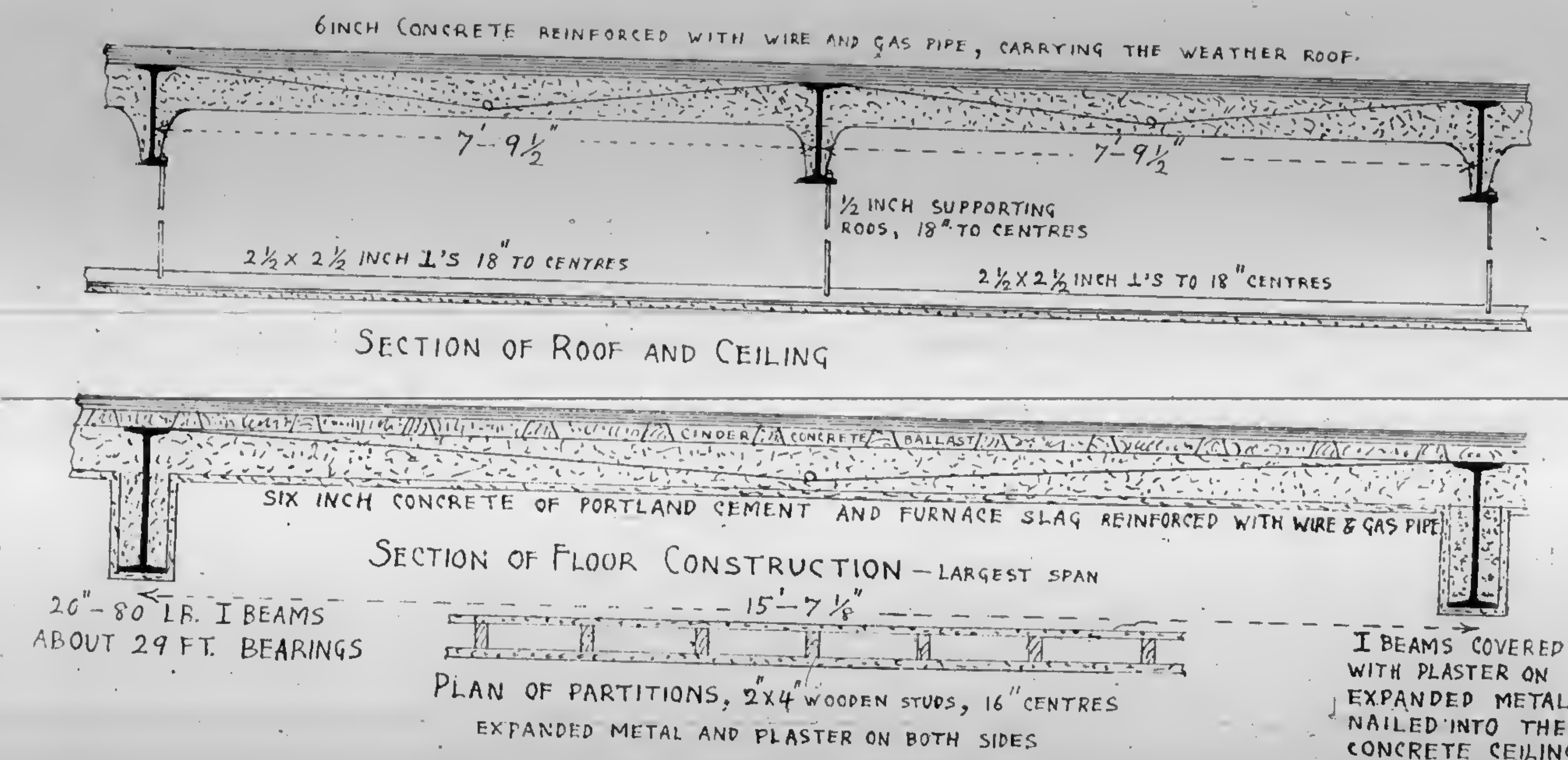


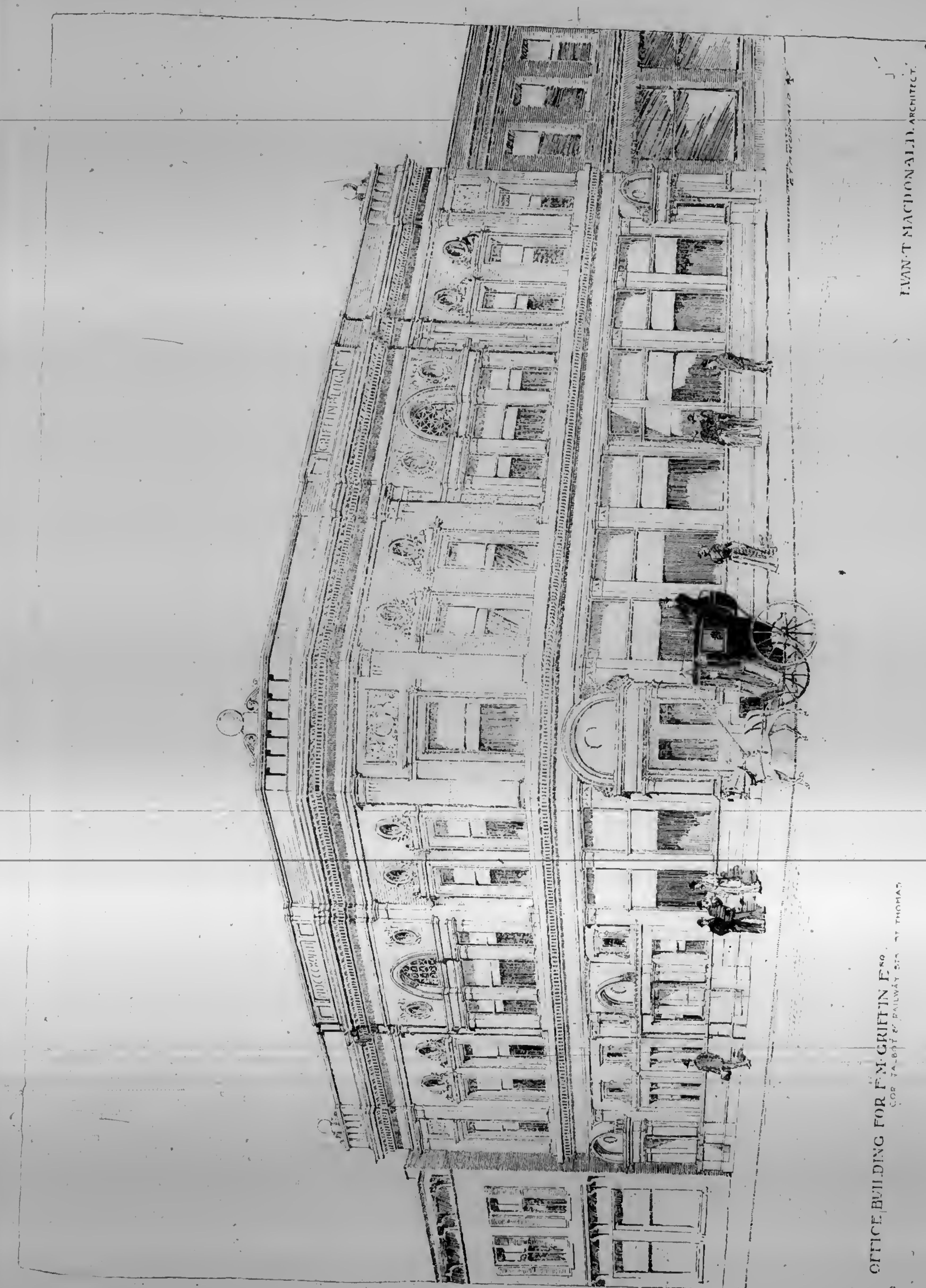
FIG. 4



FLOOR, CEILING, ROOF AND PARTITION CONSTRUCTION IN
METHODIST EPISCOPAL BUILD'G. PITTSBURGH

FIG. 5

ILLUSTRATIONS ACCOMPANYING MR. BURKE'S PAPER ON "TWO QUESTIONS IN CONNECTION WITH STEEL CONSTRUCTIONS IN BUILDINGS," IN THIS NUMBER.



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—THE—

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Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery.

A Hopeful Sign. FOR several years prior to the first of January last there was a decrease each month in number and value of real estate transactions, as shown by the Toronto Registry office records. It is reported, however, that the first two months of this year show an increase in the volume of transactions.

Building Materials. THE scarcity of timber in Great Britain is clearly shown by comparing the extent to which wood is there employed with the quantity used in the United States. The annual consumption in England is placed at only 18 cubic feet per capita, while in the States it is about 350 cubic feet. The introduction of iron and steel in building construction has, however, already greatly lessened the use of wood for this purpose in the large cities of the United States, and is destined to restrict its employment to a much greater extent in the future. The change is opportune, in view of the growing scarcity and costliness of white pine and other choice varieties of building timber.

Another Building Disaster. FOLLOWING close in the train of the recent building disaster at London, Ont., with its terrible consequences, comes the news of the collapse on Feb. 21st of the roof of a large music hall at Oshawa, Ont. The building is described as a three-story brick structure, with a large assembly hall on the upper floor. It was covered by a flat roof about 75 × 100 feet in size, which fell to the second floor, completely covering the seats in the music hall. The accident occurred at five o'clock in the morning. To this fortunate circumstance is due the fact that a number of lives were not sacrificed. On the preceding Saturday evening a large political meeting was held in the building, and on the evening of the day on which the accident took place an entertainment was to have been given at which it was estimated there would have been present 800 persons. How terrible, therefore, would have been the consequences had the accident been delayed but a few hours! Doubtless the immediate cause of the collapse was accumulation of snow on the roof, but the fact that the roof was a new one and that the building had recently undergone changes and repairs, at a cost of about $5,000, is sufficient

proof of structural weakness. These accidents unmistakably affirm the necessity of a standard of qualification on the part of those who undertake to design and erect buildings—particularly those of a public character. If the title Architect was restricted to persons who had passed a qualifying examination, as is now the case in the province of Quebec and the State of Illinois, the public would at least be enabled to know who were qualified to put up safe structures, and could then govern themselves accordingly. Under present circumstances anybody is at liberty to call himself an architect and to design and erect buildings of every class. So long as this condition of things shall continue, accidents involving injury and loss of life will be the inevitable consequence.

The Sanford Mausoleum. THE New York Herald of the 16th of January prints an illustration and description of a mausoleum to be erected by Senator Sanford, of Hamilton, at a cost of $100,000. The design is that of a Grecian temple, 30 feet long and 18 feet wide, with heavy roof, supported on all sides by polished pillars. The structure, which will weigh 300 tons, was designed by Charles E. Tayntor & Co., of New York, and is to be constructed of Vermont granite. The interior will be finished in American marbles and mosaics, with massive bronze doors and lined with steel. While admitting that art is cosmopolitan, we fail to see anything in the design or materials of this structure the equal of which might not have been obtained in Canada. Several structures of this character, creditable alike in design and execution, have in recent years been erected in Toronto, London and elsewhere, with native materials, and at a cost by comparison greatly below that of the proposed Sanford Mausoleum. It is therefore to be regretted that Senator Sanford has not seen fit to encourage and aid art and industry in the country from which his wealth has been derived.

Equal Rights for Labor. THE courts at Massachusetts have lately decided that a municipal corporation has not the legal right to provide in its contracts for special privileges to union workmen. A firm of builders who had entered into a contract with the city of Boston for the construction of a bath house, were restrained by the Mayor from completing the work on the ground that they were not employing union workmen. The Mayor's action is said to have been dictated by the unions. The contractors thereupon applied to the courts for an injunction restraining the Mayor from interfering with the fulfilment of the contract. The injunction was granted, the court holding that "There is no authority in law for any officer of the government, state or municipal, to force a discrimination as was attempted in this case between workmen in respect to the privilege of labor on public work paid for by taxes levied upon all, for no reason except that some workmen belong to a certain party, society or class, and others do not; thus giving labor and the benefit of it to one class and denying it to another, regardless of their rights, needs, qualifications or merits, or the public welfare."

Sewer Ventilation. IT is gratifying to observe that Alderman Denison, a well-known Toronto architect, has given notice of his intention to move in the City Council for a report from the City Engineer on the advisability of providing some adequate system of ventilating the sewers. The subject is a most important one, and as such will we trust be dealt with in a thorough manner at an early date. There is little room to doubt that the infectious diseases which have been so prevalent of late in what are supposed to be choice residential districts of the city originated in foul exhalations from the sewers. The precautions exercised by architects for the preservation of the health of the future occupants of the houses built under their direction are to a considerable degree nullified by the sewer gratings at the street levels, the foul odors from which assail the pedestrian, and in summer find their way into the houses through open windows. The public health demands that greater attention be paid to this subject, and that improved methods of sewer ventilation be adopted, especially in the northern part of the city, where in some cases the sewers have dead ends, and owing to the tendency of the gases to rise to the highest level, the evils to which we have referred exist in an aggravated form.

The Builders' Exchange Movement. IT is with satisfaction that we record the organization of a Builders' Exchange at London, Ont., particulars concerning which are printed in this number. The new Exchange appears to have started out under favorable auspices, being supported by the leading contractors of all trades. The promoters have announced their desire to work in affiliation with the Toronto organization, the officers of which rendered valuable assistance in connection with its formation. The purpose in view is to secure the formation of Builders' Exchanges in all the leading cities of the province, and it is hoped that from these may ultimately grow a provincial organization, such as the CANADIAN ARCHITECT AND BUILDER endeavored some years ago to have formed. If well managed, these local Builders' Exchanges will be able greatly to improve building conditions in the localities where they exist. It is only reasonable to expect that the benefits which have followed co-operation of effort in other lines of business will accrue to the building trades also as the result of the adoption of a similar course of action. There are many abuses existing which will never be removed except as the result of concerted effort. This movement towards organization has therefore our best wishes for success.

Ashes in Mortar. COL. Waring, Street Commissioner for the city of New York, is given as authority for the statement that ashes mixed with lime make a mortar superior in point of lightness and strength to mortar composed of lime and sand. By the substitution of ashes for sand the cost of the mortar would be reduced by more than one-third. The effort will probably be made to legalize under the building laws the use of ashes by the manufacturers of machine-mixed mortar, now almost universally used by New York builders. The discovery of the value of ashes as an ingredient in the manufacture of mortar is said to have resulted from experiments recently carried out by Mr. Joseph A. Shinn, of Pittsburgh, Pa. Mortar composed of nine parts of fine anthracite ash intimately mixed with one part of fresh lime and properly wet with water, when 30 days old, gave an average tensile strength of 65 pounds per square inch, as compared with 15 pounds per square inch in the case of mortar composed of lime and sand. The crushing strength was also seven times greater than that of ordinary mortar, being in some cases as high as 1,000 pounds. It also offered much greater resistance to the action of fire and water. There was, however, lack of uniformity of results—some samples giving evidence of much greater strength than others. In order to secure satisfactory results Mr. Shinn declares that the mortar must be thoroughly mixed by machinery.

Architecture at the O.S.A. Exhibition. THE Ontario Society of Artists, whose annual exhibition will be held in Toronto in May, have expressed a desire to have an architectural section in the exhibition, and invite architects to send drawings of their work. Intending exhibitors must send in advance of their drawings, an application form, copies of which may be had from the Secretary of the association, Mr. R. F. Gagen, 90 Yonge street, Toronto, or Mr. W. A. Langton, Registrar of the Ontario Association of Architects. Drawings must be framed and must be delivered not later than April 30th at the gallery of the Ontario Society of Artists, King street west, Toronto. We presume that the usual rule holds that the drawings contributed must be new, in the sense of not having been exhibited before at any exhibition in Ontario.

Question and Answer. A QUESTION was propounded with reference to the architectural drawings exhibited at the Royal Canadian Academy Exhibition now in progress in Toronto—Should a perspective view of a building be exhibited under the name of the architect if it is not drawn by himself? The answer is obvious—that it is the design that is exhibited. If the drawing is well done, the design is favorably exhibited; if badly done, the design is poorly exhibited—that is all. The purpose of the drawing is to exhibit the building, and there is no room for the artists' contention that a drawing is not so much a matter of subject as of the handling of it. That is true of an artist's work. He makes nature the occasion to produce his own emotions in the mind of the person who views the picture; but the business of the architectural draughtsman is to exhibit the building in the clearest and most suitable manner. To make a picture of it and above all to make a subjective picture, representing a mood of his own mind, is an impertinence. He obtains in his own sphere recognition and reputation, and is indeed often better known than the architect whose work he is illustrating, but the ground of his reputation will be his skill and taste in representing the character of the design, which, not his drawing, is the thing exhibited.

ILLUSTRATIONS.

BANK OF BRITISH COLUMBIA, VICTORIA, B. C.

DESIGN FOR PASSENGER STATION.—E. T. MACDONALD, ARCHITECT.

BANK OF MONTREAL, VICTORIA, B. C.—F. M. RATTENBURY, ARCHITECT.

HOUSE, UNIVERSITY GROUNDS, TORONTO.—CUMBERLAND & STORM, ARCHITECTS.

THREE HOUSES FOR MR. T. N. JAMIESON, WOODLAWN AVENUE, CHICAGO.—DWEN & WHITE, ARCHITECTS, CHICAGO.

CHURCHES AND SCHOOLS, VICTORIA, B. C.

1. South Ward Primary School; W. Ridgeway Wilson, architect. 2. Pandora street Methodist church; Thomas Hooper, architect. 3. St. Andrew's Presbyterian church; the late L. Buttress-Trimen, architect. 4. R.C. cathedral (from plans of R. C. cathedral at Longueuil, Que.) 5. Central and High schools and gymnasium; W. S. Gore, architect. 6. North Ward Primary School; J. Soule, architect.

BY THE WAY.

LYCH or Lich (to use the earlier spelling) is derived from the Anglo-Saxon word "lich," a corpse, hence corpse gate; and lichway (corpse way) being the way to the burial place. They are roofed gates through which the body is carried to the grave—roofed to provide protection from the elements whilst the bearers rested with the bier and its doleful burden until the priest came forward to perform the last sad and solemn rites. Thus they served a useful office, whilst by their ancient character and picturesque beauty they add not a little to the peaceful solemnity of those quiet enclosures

Where heaves the turf in many a mouldering heap.

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THE philological editor of the Inland Printer has recently been looking into the origin of the word "hoarding," as applied to building, and finds that it was originally applied to the board structure, with roof, built on the top of the walls of the old mediæval fort or castle to protect the archer and give him a good opportunity to shoot or throw stones on the enemy. From the ruins of these old fastnesses the term got to be applied to any old decayed wooden building, and was used by Dickens in his novels. The transition from the old ruin or abandoned structure, so handy for the ubiquitous bill sticker, to the modern well-built billboard is as obvious as it is interesting.

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I AM heartily in accord with the suggestion of a writer in the London Plumber and Decorator that there would appear to be no reason why the spirit of humor should not be manifest in the decoration of certain apartments of a house or public building. Why not in, say, a billiard or smoking room? Think, for example, says the author of the idea, what might be done in this way by an artist like J. A. Shepherd, whose exceedingly clever and funny pictures of animals are so well known to readers of the Strand Magazine and other popular journals. He could certainly produce drawings that, if properly carried out on the walls of, say, a public billiard room, would prove of lasting enjoyment and probably of considerable financial benefit to the owner. The merely quaint has been used in interior decoration with success, why not then the humorous?

CRAYON FOR DRAWING.

Crayon may be used along with charcoal in a manner to gain the agreeable transparency and delicacy of tone of the latter along with the firmness and permanency of the former. One begins with a slight sketch, indicating the shadows and the principal values in crayon, but several shades lighter than they are ultimately intended to be. This work is gone over with the charcoal, bringing it up to nearly the full possible strength of color, and obtaining all the values by stumping, rubbing in with the fingers, and the other means known to the charcoal sketcher. Lastly, the outline is drawn in firmly, and the strongest darks are added with the crayon, and lights are given with white chalk, as Chinese white would take up the charcoal and become of a disagreeable grey. The preparation in crayon holds the charcoal, and fixes it to a certain degree; still the drawing must be handled carefully, and should be preserved under glass.

BUILDING ACCIDENT AT OSHAWA.

THE illustration on this page gives a view of the music hall at Oshawa, the roof of which fell in recently. The roof, the span of which was 63 x 42 feet, was formerly carried by two beams, about 10" x 12". Beneath each of these beams were two brackets 8' x 12" x 10". Supporting each beam and brackets were two oak posts 10" square. In order to afford a better view of the stage the owner of the building removed one of these beams and its supports and replaced it with the truss appearing in the engraving, without apparently making any calculation as to its adaptibility to safely carry the imposed load. The removal of this beam left 42 feet of roof to be carried by the remaining one. Placing the weight of roof at 60 lbs per foot, inclusive of 20 lbs. per foot for weight of snow, the total weight imposed on the beam would be about 30 tons.

BUILDING ACCIDENT AT OSHAWA, ONT.

TORONTO CHAPTER OF ARCHITECTS.

THE regular monthly meeting of the Toronto Chapter of the Ontario Association of Architects was held in the School of Practical Science on Feb. 14th, at which Mr. Wright, of the School of Practical Science, exhibited illustrations of crushed posts and beams, and gave a series of formulæ on the blackboard.

Mr. H. B. Gordon read a valuable paper on "Points in Wood Construction."

Mr. S. G. Beckett read an interesting paper on "Decoration," bringing out many important points governing the principles of decoration.

The meeting was considered by everyone present to have been most profitable. The attendance is gradually increasing, and it is hoped that before long every architect in the city will become a member of the Chapter.

For the artificial ventilation of a school by warmed air, Dr. Kerr says that 1,000 cubic feet per hour per child should be the lowest estimate, the accommodation being reckoned at 10 square feet per child, 8 square feet in infant departments. The temperature of the room should be maintained at 60 degs. Fahr.

TREATMENT OF DAMP WALLS.

WE have known of cases of dampness of walls successfully treated by coating with hard oil. Water glass, linseed oil and beeswax, paraffin wax in heavy coal tar, are also often successfully employed in overcoming dampness in walls. Probably what is widely known as Sylvester's solution is the best agent extant for the treatment of damp walls. The fame of this solution was firmly established when upon the application of four coats of it to the walls of the reservoir of the Croton Aqueduct in Central Park they were made proof against the further assertion of moisture. This solution consists of two divisions, if we may borrow a military phrase, intended for a first and second treatment. First take 1½ lbs. of castile soap and dissolve it in two gallons of hot water—soft water to be preferred, always. After cleaning the walls apply this solution hot, using a whitewash or other broad, flat brush. Avoid beating the solution into a foam or suds in applying it. Maintain a moderate degree of temperature in the apartment. The day following apply the second part of the solution, which is made by dissolving one pound of alum in eight gallons of water, having the water at a temperature of, say, 65 degrees F., and keeping the solution at about this temperature while applying it to the walls. The third application should be of the soap and water, and the fourth of the alum and water, the alternating coats forming, it is said, a chemical union absolutely impervious to moisture. This solution, when necessity compels, may be applied at the rate of two or more coats per day, but a space of twenty-four hours between coats will more reliably insure the proper hardening of the successive coats.—Painters' Magazine.

The best paint for floors is made of finely ground yellow ochre mixed with litharge, emery and boiled oil. The work should be primed with oil and ochre, mixed very thin and well brushed in, and then the paint be applied, allowing plenty of time between each coat. Two or three even coats should be given, finishing with a coat of elastic floor varnish.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

LECTURE BEFORE THE ART ASSOCIATION.

ON the evening of Feb. 18th, Mr. Robert Harris, A.R.C.A., lectured to a large and appreciative audience at the Art Association rooms, on "Some Early Florentine Painters." The lecture was accompanied by a number of illuminated views illustrative of the work of the various artists.

MONTREAL HARBOR IMPROVEMENT.

The accompanying plan, known as plan No. 12 A, for which we are indebted to the courtesy of the Montreal Gazette, shows the improvements which are to be made to the Montreal Harbor.

GENERAL PLAN OF MONTREAL HARBOR SHOWING PROPOSED IMPROVEMENTS.

The Harbor Engineer, Mr. Kennedy, was unable to see eye to eye with the government regarding the character of these improvements, and the present scheme is a compromise as between conflicting opinions. It shows three piers, 300 feet wide, one being 850 feet, one 1,000 feet and the other 1,020 feet in length, on the centre line, designed to give 9,770 lineal feet of wharf front, and to afford accommodation for sixteen ocean steamers, 500 feet long. The cost of the improvement is to be entirely borne by the government.

DETERIORATION AS AFFECTING THE VALUE OF BUILDINGS.*

BY S. G. CURRY.

THE reason I wish to have a discussion on this matter is because in arbitrations one finds such varying opinions on the part of professional men that it is somewhat astonishing, and it seems to me it would be well for the profession to discuss, as far as possible, these problems, in such a way that we may arrive, if we can, at some definite principle.

Depreciation may be divided into three classes. First there is the depreciation due entirely to wear and tear of the material, irrespective of any other deterioration; then there is the question of depreciation which must be looked at from the financial aspect, and in addition to these there is the depreciation which is the result of changed conditions. In the first place, then, we have the depreciation of material by reason of wear and tear, which simply means that if you erect a building, that building will be good for its purpose so long as the material in it will hold out, and, of course, that is merely the question of finding out what is the average life of the different materials used in the construction of a building. There are tables with regard to wear and tear, doubtful, of course, to some extent, but at the same time giving a fairly reasonable basis of calculation. I have not thought it worth while to bring any of these tables forward, because that, again, is very largely a question of the kind of material. You cannot say that all brick will last seventy years, because some bricks may be hard and some soft; it is a question of how long the particular brick in question will last, so after all there must be various opinions with regard to the life of the material itself.

On the basis that materials have a definite life according to quality and position certain individuals have worked out tables which they support, on the principle that the first year there is no wear and tear, the second year ¼ per cent., with an increasing percentage each year until 100 per cent is reached in sixty, seventy or a hundred years, as the case may be, based entirely on the wear and tear of the material. Then there is the other side of the matter, the financial question. If you put $5,000 into a building you must figure on receiving sufficient return on the money invested to return you a fair interest and the principal money before the substance in which you have placed it disappears, because, after all, a building must dissappear in time. You must get such a rental as will give you not only fair interest on your investment, but return you the principal before the value of the building has gone. The question is, what amount is that per year? Some figure the wear and tear the first year as nothing, and only ask for a return to cover interest, but I think the first year is the very year in which a building should give the best returns, and pay forth the greatest proportions per year of the principal money. If you figure out the financial result on the basis that the wear and tear is light in the earlier years you are going to have a building when dilapidated making better returns in the form of rent at the end than at the beginning, which it certainly will not do. So that in any case you must first figure the interest you require, and then add to that sufficient to cover the loss of the principal, and that must be made during the earlier years, because during the later period you will find some difficulty in doing it.

Then there is the third question, of changing locations. You may erect a building in a certain part of the city today in which it at present serves its purpose perfectly well, but after a time, owing to changed conditions, it becomes practically valueless; it may be in ten years, fifteen years, twenty years or fifty years, and then you get no return for either interest or principal. The fact of the removal of the Courthouse and city buildings from where they are now to another site will affect the value of the property down near the City Hall, and what was at one time worth $10,000 you may not after a time be able to get a purchaser for at $2,000 or even $1,000, so that these things all work through the value of a building. Now, I think these are all matters that should be considered in arriving at the value of a building, or in ascertaining the deterioration in value of buildings.

Mr. Cecil B. Smith has resigned his position as assistant professor in Civil Engineering at McGill University, to join the engineering staff of the C. P. Railway.

* Introductory paper read at the annual convention of the O.A.A., January, 1898.

POMPEII—A CITY OF THE FIRST CENTURY.*

By Prof. Adams, McGill University.

You will, I think, agree with me that Italy is the most beautiful country in Europe, but on the extended coast line of that beautiful country one sweep there is of transcendent beauty—the Bay of Naples—by the shore of which is situated the city of that name. And if we were to-day steaming into the Bay of Naples on any of the great trans-Atlantic liners—and let us suppose the hour to be somewhat earlier, that some remnant of the bright Italian daylight might still remain—we should have before us one of the most lovely views in the world, and we should at the same time be on the threshold of a district every foot of which is of classical or mediæval interest. The waters of the bay—deep blue, like all the rest of the Mediterranean—would encircle us in a vast horseshoe. On our left would be the promotory of Misenum, with the islands of Ischia and Procida, beneath the former of which the giant Typhon, overcome of the gods, lies buried; and as in the narrow house of his captivity he turns, restlessly straining his bonds, the walls of his prison-house tremble and are sometimes rent asunder; while on our right the island of Capri, with the twelve palaces of Tiberias Cæsar, towers up in snowy whiteness. From such a sea you might well believe that Aphrodite rose to take empire of the earth.

To the north-west of the bay is the broken, irregular, hilly country known to the ancients as the Phlegrean Fields, for this was the battle-ground of the gods and giants. Here is also Lake Avernus, and the cave of the Cumean Sibyl sung by Virgil, and here also Virgil's tomb.

To the north-east this broken country is succeeded by an extensive plain, known to the ancients, from its fertility and beauty, as the Campania Felix. The plains and slopes are everywhere clad with verdure, farms and vineyards, interspersed with groves of myrtle, lemon and orange trees, stretching as far as the eye can reach—with farm-houses and villas, and here and there a ruined temple.

At this point lies the city of Naples, built on the flank of a range of hills, and crowned by the fortress of St. Elmo—the largest city in Italy, which, with its suburbs, Posilippo, Portici and Resina, stretches for several miles along the bay.

But to every observer one object will seem to dominate the landscape. Rising from the plain behind Naples is an isolated mountain of peculiar and striking form, resembling two interpenetrating cones, and on the summit of the eastern cone, the observer sees a remarkable phenomenon—"A cloud by day and a pillar of fire by night"—and at once recognizes the mountain before him as one of the class of so-called burning mountains or volcanoes; perhaps the most celebrated of them all—the volcano Vesuvius.

Now could we have visited this district in the time of our Lord, the landscape would have appeared different in certain of its features. Vesuvius would have been larger, but lower, and would have shown no signs of activity. Strabo (died A.D. 25) an observer of remarkable acuteness, saw it about this time, and describes the mountain as being clothed with farms and vineyards to its very summit, where, however, there was a flat barren stretch, on which the rocks were fused and slaggy, bearing the marks of fire, which led him to conjecture that the mountain had at one time been a volcano. No eruption, however, had taken place in historic times.

About the foot of the mountain, in addition to Neapolis, were several small cities, the chief of these being Herculaneum, Pompeii and Stabiae, all Greek towns, which passed successively under the dominion of the Etruscans, the Samnites, and finally of the Romans. To the student of architecture these cities have an unique importance, for while we have remains of Roman temples and other public buildings, dating back to this time, which afford a thorough insight into their plan and construction, were it not for the excavations at Pompeii it would be utterly impossible for us to form any adequate idea of the domestic architecture of the Romans.

In the whole city of Rome the remains of but one private house have been unearthed, that of Germanicus, found in 1869 in excavating the Palatine. Elsewhere, as in Britain at Silchester, the remains of a few houses more or less aberrant in type have been discovered, but in Pompeii hundreds of Roman houses, great and small, elaborate and simple, and of various dates and styles of construction, are to be seen, which, with their appointments, reveal to us in the most striking manner the everyday life of the Roman world nearly 2,000 years ago.

Now any knowledge which we can obtain concerning these cities at this time is of especial interest: 1st. Because they were examples of the smaller Roman cities during the most civilized and the haughtiest age of the Roman Empire, when Rome was at the highest eminence of its luxury and power. 2nd. Because it was at this time that Christianity was being first preached and was making its way through all parts of the empire. It was in such cities as these and among such scenes as these present, that St. Paul and his co-workers found themselves, and sought converts to the new faith.

And here in these cities of the plain they ate and drank, they bought and sold, they married and were given in marriage, till on the 5th of February, A. D. 63, there came an earthquake (recorded by Seneca) which threw down a great part of Pompeii and also did much damage at Herculaneum. This was followed during the next year by another earthquake, which took place while Nero was singing at Naples, the building falling unfortunately immediately after the emperor had left it. These, however, were but presages of a still more violent catastrophe, for the 24th of August, A. D. 79, the great Roman naturalist, Pliny, who was the admiral in charge of the Roman fleet at Misenum, looking from the deck of his ship across the bay, saw a remarkable cloud, like an Italian pine tree, rising from the top of the mountain. This was as black as night, but pierced from time to time by vivid flashes of lightning. From this dense clouds of ashes commenced to fall, accompanied by torrents of rain, which, mingling with the finer ashes, produced rivers of mud, which rushed down the slopes of the mountains with resistless violence, so that where there had been a group of picturesque cities rising from the vineyards and corn-fields of the fertile plain, there was in the course of a few hours nothing but a great greyish-white expanse of ashes, volcanic mud and lava blocks covering the whole country.

Nothing remained to indicate the position of Pompeii but the upper portion of the wall of the great theatre and the elliptical outline which indicated the spot where the amphitheatre of the town lay buried. What followed we do not know precisely. There is evidence to show that some few of the people who fled from the city returned and contrived to locate their houses and dig down and recover some of their buried valuables. But in the course of a few years, the volcanic ashes forming a fertile soil, the plain was once again cultivated, possibly by the very people who had been driven forth, and, as time went on, the very site of the cities were completely forgotten, notwithstanding the fact that the site of Pompeii always bore in subsequent times the title "Civita," or the city. And so the city lay buried for fifteen hundred years.

In 1595, a subterranean aqueduct, made to bring water to the town of Torre dell'Annunciata, passed under the buried city, and some of the foundations of houses were encountered, but this circumstance does not seem to have awakened any curiosity. In 1748, a Spanish Colonel of Engineers, who was employed to examine the subterranean tunnel above mentioned, was led to conjecture that some ancient city lay buried there, and obtained permission to undertake some excavations, and from this time onward these were continued in an irregular manner and on a limited scale, with varying success. Any doubt, however, which may have been entertained as to the identity of the city, was removed by the discovery, in 1763, of an inscription recording the restoration to the municipality of the Pompeiians, by Vespasian, of all the public ground occupied by private persons.

The workmen employed in these excavations were generally condemned felons, who worked chained in pairs, and Mahommedan slaves, taken from the Barbary pirates.

The object of the excavations was simply plunder. The marbles were removed, the mosaics broken up; all objects of value were sold for what they would bring. Even the interesting water pipes were melted down for old lead, and it was not until 1860, when the Neapolitan provinces became a part of united Italy, that the government took the matter in hand and instituted a regular plan of excavation, placing Prof. Fiorelli in charge of the work. Now, careful records are kept of every foot of ground turned over, and all that is valuable, but would be destroyed if left in situ, is transferred to the great National Museum at Naples, where it is safely housed and excellently displayed for study.

It is estimated that in about fifty years the excavations will be completed, and the whole city laid open, though this, of course, depends upon the amount of subsidy granted by the government. It is, however, to be regretted that, owing to financial difficulties, the grant has been considerably reduced in recent years.

Through Signor Fiorelli's labor we can now for the first time picture to ourselves the appearance of a Roman town. This map will serve to show the outline of the city, and the proportion of it—about one-half—which has already been excavated. The walls are seen throughout almost their entire extent. The city is an irregular oval, its extreme length within the walls being about three-quarters of a mile, and the greatest breadth not quite one-half mile.

The population is estimated at 12,000, and an allowance of 8,000 more for the suburbs is probably a liberal one—20,000 in all.

The main streets are at right angles to one another, thus dividing the city into insulæ, or blocks, and it will be noticed that these insulæ or blocks are solid masses of buildings, not cut up or traversed by lanes or alleys. The insulæ have been named or numbered for convenience of reference, but in Roman times there was no such designation, or at least none such was posted. The reason for this will probably be that the streets of all Roman towns were known by a regular series of names, the principal street running north and south being called Cardo, and that running east and west being called Decumanus. The streets now as excavated have names assigned to them derived from something characteristic in their position or something significant to be found in them. It has been conjectured that the street now called the street of Stabia was the Cardo of Pompeii, while the Decumanus Major was the present Street of Nola, and the Decumanus Minor, the Street of Abundance.

I will ask you, this evening, to take a stroll with me through this ancient city.

We enter the city, as all visitors do, through the Porta della Marina, or Sea Gate, and passing along the Strada della Marina, enter the Forum, then, crossing the Forum, down the Street of Abundance and up the Street of the Theatre, past the Temple of Isis to the Greater and Lesser Theatres; then, by the Gladiatorial Barracks, to the Amphitheatre, and back by the walls and the Street of Nola to the western part of the city, visiting two private residences situated on the Street of Fortune, the House of the Tragic Poet and the House of the Fawn, which I would select as samples of Pompeiian houses of wealth and refinement, for the western part of the city must have been the portion in which the well-to-do and fashionable people lived, no houses of the poorer element having been as yet unearthed. They probably lived down toward the Amphitheatre.

There was then a west end in the first century as there is in the nineteenth.

A more accurate idea of the appearance of the city than can be obtained from the map is afforded by this photograph of a portion of a large and very accurate model of the city which is exhibited in the Museum at Naples.

The Street of Stabia, the Cardo of Pompeii—we come down the Street of Abundance from the Forum, up the Street of the Theatre to the smaller Temple of Isis, the two theatres, the Gladiators' Barracks, and then off to the Amphitheatre on the right.

The compact manner in which the city is built, as well as the fact that the roofs, being made of wood covered with tiles, burned and fell in, will be noticed. All the debris has been removed from the city, however, and it therefore presents a clean and neat appearance, as well shown in this photograph.

Leaving Naples, then, by any of the half-dozen trains which daily start for the south, passing by the city of Herculaneum, and cutting across several lava streams which at various times have found their way into the waters of the bay, and skirting the Bay of Naples, in somewhat less than an hour, having gone some 17 miles, we hear the guard call out "Pompeii!" Alighting, we pass up a picturesque lane crowded with beggars in various stages of disintegration, to a gate leading into a garden. Here, purchasing our tickets, a guide is assigned to us and we pass on through the garden a few steps further and reach the wall of the ancient city, then up a rather steep archway and we enter the Sea Gate.

Continuing straight across we pass down the Strada della Marina and through to the Strada della Abundanzia, the Street of Abundance. The scene before us is a street corner in Pompeii. The Street of Abundance here meets the little side street or lane of Venus and Mars.

The street, it will be noticed, is paved with large, irregular, polygonal blocks of lava, fitted together after the manner of the Etruscans. This method of paving the Romans learned from the Etruscans, and it is thus that the Roman forum is paved. A narrow, raised sidewalk bounds the road on either side. The road is worn into deep ruts by the wheels of the carts which passed over it two thousand years ago.

Only a part of the town seems to have been furnished with sewers, hence the streets were waterways and must have been impassable in heavy rains. Stepping stones were accordingly placed across them at frequent intervals, as now in Baltimore.

In the front of the picture is a fountain and drinking trough, made of marble, and which is surmounted by a figure symbolical of Abundance, crowned with a vine, and bearing a horn of plenty. From this the street derives its name of the Street of Abundance.

The materials used in the construction of the city are here well seen. The house on the right is built of blocks of travertine, accurately cut and laid together without mortar. Such houses, however, are not common. They occur here and there in the city, and are in all cases very old houses, dating back at least to the 3rd century B. C. This style of masonry was called by the Romans, Opus Quadratum, and in Rome, where it is also found, is the most primitive among the existing methods of building. The early date of these houses in Pompeii is also shown by a primitive arrangement of the rooms, a peculiar simplicity of mural decoration, as well as the absence of a second story to the structure.

The houses of later date, and most of the houses in Pompeii belong to this class, are built of a sort of concrete or rubble work, faced with what the Romans called Opus Incertum, or with flat tile like bricks. This was formed by studding the face of the concrete wall with irregular shaped pieces of volcanic tufa, 3 to 4 inches across, each having its outer face worked smooth and the inner part roughly pointed. An example of this is seen in the building on the left. The brick faced concrete and the use of bricks in the arches is also seen. This house was built A.D. 14-24.

Still later another style of facing came into use, the so-called Opus Reticulatum (from its resemblance to the meshes of a net). This is similar to Opus Incertum except that the stones are carefully cut so as to present a square or lozenge shaped end, and are fitted closely together. A concrete wall thus faced with Opus Reticulatum and brick is here shown (taken from the work of Middleton, who is our great authority on these subjects). This style of work is everywhere in the Roman dominions, a sign of construction of the Imperial age. An example of it will be presented later on.

As a general rule this masonry or brickwork is covered with a hard and very fine white stucco, worked to resemble marble, of which it is an excellent imitation. There is stucco everywhere in the city, both within and without the houses, just as in Naples at the present day.

The building on the left, to which I have asked your attention, is a portion of an exchange of Eumachia, which must have been a very handsome building in its day. It was erected, as we learn from an inscription, by a priestess of the name of Eumachia, at her own expense, and dedicated to Concordia Augusta. It will be remembered that the temple of Janus, in Rome, was always open in time of war, and that Augustus closed in in token of the universal peace of the Roman empire, in the very year in which our Saviour was born. Horace mentions the facts in his Odes, thus showing that it had a hold upon the popular feelings of his day, and this building in Pompeii was no doubt dedicated to commemorate this famous universal peace.

It was probably used for a stock exchange; the small chamber was for the doorkeeper; the steps ascended to the upper floor; the walls on either side were painted in black panels, divided by red pilasters; a statue of the foundress stood in a niche opposite the entrance. This, which is a view down the streets of Stabiae, shows the ruts better.

Passing down the street, and turning up the corner to the right, we pass the Temple of Isis (whose worship seems to have been the fashionable cult in Pompeii, having been brought from Alexandria, with which city Pompeii, being a seaport, had a large maritime trade), and reach the two theatres, the greater having been used for the presentation of tragedy, and the smaller, as its construction indicates, for the production of comedy.

This is the view of the greater, the Tragic Theatre, which, as will be seen, is in a state of tolerable preservation, although the ashes have not been completely removed from the seats. It is semi-circular and was open to the sky and adorned in every part with white marble. The seats faced south, so that the audience, while watching the progress of the play, had at the same time a

* Abstract of a lecture delivered before the resident members of the Province of Quebec Association of Architects at Montreal, January 29th, 1898. The lecture was illustrated by lantern slides.

magnificent view over the plain of the Sarno as far as the mountains of the Stabiae.

Owing to the great height of the outer wall, the upper portion of it always remained above ground, although no one seems to have suspected that it was the wall of an ancient theatre of a buried city. The benches are spaced off and numbered as in a modern theatre, the space allowed each person being fifteen and one-half inches, the theatre accommodating 5,000 persons. There was no confusion on entering the theatre, for around it was a series of doors, each leading to a set of steps, the door which should be entered being stated on the tickets of admission. The men of rank sat in the orchestra, on chairs of state carried thither by their slaves; others, on the upper rows of marble benches, usually on cushions which they brought with them. Above was the women's gallery, partitioned off into compartments like the boxes in English or Continental theatres. Above, great projecting blocks of stone pierced with holes served to support masts which upheld the awnings spread to protect the spectators from the sun or rain.

The stage is wide and very shallow, but few persons being upon it at any one time. In the absence of a roof, the voices of the performers would have been lost on a deep stage. The scene was immovable, and built of brick or marble, representing the facade of a royal palace, and was pierced by three doors, handsomely decorated, the central door being used by the principal personages, the door on the right wing by inferior personages, and that on the left wing by foreigners, or persons coming from abroad. Along the front of the stage is the opening through which the curtain was lowered. The musicians sat in the niches in the front of the stage. The chorus moved in the semi-circular space in front of the stage, passing on to the stage at the completion of the play by the steps.

Note the opus reticulatum, a masonry of diamond pattern, everywhere in the Roman dominions, as has been mentioned, a sign of construction of the Imperial age.

The Comic Theatre is smaller and of inferior construction, a fact probably accounted for by an inscription which informs us that it was erected by contract. The stone steps on the left led down to the gladiator's barracks or fencing school, which consists of a square of exercising ground surrounded by a block of stuccoed Doric pillars, above which were sleeping rooms. The paintings on the walls of one of the large rooms were very fine, representing triumphs of gladiatorial arms. It also contained a collection of very fine bronze helmets, shields and gladiatorial arms of various kinds. The inscriptions on the walls leave no doubt as to the use of the building, as they consist of programmes of entertainments in the amphitheatre, eulogies of persons who caused them to be held, and a vow by a gladiator to Venus if his arms proved successful. Many skeletons were found in the building, probably the remains of gladiators who were wounded and unable to escape. Here, also, were the stocks, now at Naples, in which were the skeletons of four men who were undergoing this particularly unpleasant form of punishment at the time of the destruction of the city, and were evidently forgotten.

The gladiatorial school accommodated about 132 men, and may have supplied gladiators to the very large number of amphitheatres which were found within a short distance of Naples, although we learned from the inscription that 60 or 70 gladiators were often engaged in a single show at the Pompeiian amphitheatre, nearly one-half of whom were probably killed at each entertainment.

The amphitheatre is not nearly so fine as the Coliseum at Rome, or even as the smaller building at Pozzuoli or the one at Verona. It is, nevertheless, a fine and well preserved building of the class, and is calculated to have held 20,000 persons.

The Amphitheatre differs from the Theatre in that the tiers of seats run completely around the oval arena, instead of having simply a semi-circular form (the first amphitheatre having consisted of two movable theatres, placed face to face). The construction resembles that of the theatre, and need not be further described. The several classes of seats were reserved for corresponding classes in the community. A great velarium shielded the audience from the sun.

This photograph shows excellently the level of the surrounding country, from which the Amphitheatre has been excavated.

In these amphitheatres the cruel and revolting exhibitions, developed by the degraded tastes of the Romans from the innocent, athletic contests of the Greeks, were held—shows which seem to have reached the climax of their splendor in the first century of our era, or about the time when Pompeii was destroyed. Their subsequent suppression was one of the great triumphs of Christianity; the last of these contests being that in which the monk, Telemachus, sprang into the arena and separated the contestants. Although he was in consequence stoned to death on the spot by the infuriated mob, his action made such an impression on the growing conscience of the world that the Emperor Honorius was led to issue an order forbidding such performances, and the gladiator became a thing of the past.

The spectacles of the Amphitheatre were of three kinds: First, the contest between gladiators, who fought singly or in bands. In connection with the celebration of the victory of Trajan over the Daci, as many as 10,000 men fought and butchered one another in the arena, surrounded by a vast and excited throng of bloodthirsty spectators. The fascination which these contests had for the Roman populace seems to us now almost incredible. There is a fine passage in that wonderful book of St. Augustine, his "Confessions," which relates how one day one of his most intimate friends was, by some of his boon companions, haled with familiar violence to the amphitheatre, but, closing his eyes, determined not to look upon the unhallowed spectacle. Hearing, however, a great shout go up from the populace as one of the contestants fell, overcome by curiosity, he looked into the arena and became so possessed by the spirit of cruelty, and intoxicated by the desire for blood, that he returned again and again to the amphitheatre, and even seduced others to accompany him.

Second, there were the sea fights, when the arena was flooded and boats laden with armed men were rowed in from opposite sides, their crews hacking each other to pieces until the arena was a lake of blood. The Pompeiian Amphitheatre was not arranged for such contests, but the neighboring one at Pozzuoli was, the channels for the entrance of the water to flood the arena being still distinctly seen. This style of contest was eventually put down, not on account of any humanitarian sentiment, but on account of the great waste of slaves occasioned by it.

Third, then there were contests between gladiators and wild beasts. In such contests he must have appeared who "fought with wild beasts at Ephesus." But, as a general rule, the Christians refused to fight for the amusement of the populace, and were accordingly thrown into the arena to be devoured. In these contests all manner of rare and curious beasts were brought from remote parts of the earth to fight with one another and with the gladiators. Lions, tigers, bears, elephants, hippopotami, rhinoceri, crocodiles, and even gigantic snakes.

This slide is a photograph of an old picture, giving an ideal representation of one these contests. Note the velarium, the Emperor, the vestals, and the incense or perfume being burned.

The paintings at Pompeii frequently represented groups; from these "venationes," or hunting scenes, and advertisements written up in various parts of Pompeii, make it clear that this was here a favorite form of amusement. The following is a translation of one of the most important of these advertisements:

Twenty pairs of gladiators paid by Decimus Lucretius Satrius Valens, priest, in the time of Nero, the son of Cæsar Augustus; and ten pairs of gladiators, paid by Decimus Lucretius, the son of Decimus Valens, will fight at Pompeii on the 11th, 13th and 14th of April. There will be a proper hunting scene, and the awnings will be spread.—Written by Celer Emilius Celer, writer of inscriptions, who wrote this by moonlight.

Returning then to the western part of the city by the circuit of the walls, and through the street of Nola and the street of Fortune, we find ourselves in a district of narrow streets flanked by fine residences. Two of these may be taken as representative of the whole, and will serve as examples of Roman houses of the 1st century. The first of these is known as the House of the Tragic Poet, from a picture on its walls representing a poet reading; and the second is called the House of the Faun, from the exquisite bronze, known as the Dancing Faun, which was found within it.

The House of the Tragic Poet is at once one of the smallest and simplest, and yet one of the most ornate and best finished, of all the private houses of Pompeii. "It would," says Lord Lytton, who represents it as the House of Glaucus in his Last Days of Pompeii, "be a model at this day for the house of a "single man in Mayfair." Its position in the insula, one-half of which is here represented, will be seen upon the screen. Entering through the door, the visitor would find himself in a long and narrow vestibule, and would be startled by the figure of a large fierce dog in the act of springing at him, worked in mosaic in the floor, beside which is written in large characters, "Cave Canem," (Beware the Dog). Here the slave who attended the door would sit, and his constant presence was often ensured, especially in earlier times, by his being chained to his place. It was not, therefore, necessary to ring more than once in Pompeii to gain admittance. The

rooms on either side of the vestibule were rented as shops, and were, so certain of the classical writers tell us, one of the best kinds of property in which one could invest his money. Passing through the vestibule we reach the Atrium, a court roofed in about its margin but open to the sky in the centre. Beneath this open space was a shallow reservoir to collect the rain water coming in from the roof, and known as the Impluvium. In this Atrium the clients and visitors of inferior rank were received and business was transacted. It was in fact the public part of the house, and in the houses of the more "respectable" an "atriensis," or slave peculiarly devoted to this hall, was retained, whose rank among his fellow-slaves was high and important.

Off this Atrium opened several smaller rooms, and its walls were richly ornamented with fine paintings of classical subjects; one of the Parting of Achilles and Briseis is especially celebrated. The floor was paved with mosaic. A narrow passage would lead us through to the private apartments, which are situated about the Peristyle, a second court like the Atrium but surrounded by columns. In the open central space was a charming little garden. Opening off the peristyle was the tablium, where the family records were kept, and which probably was used as a drawing room; and the triclinium, or dining room—in this house, often called the Chamber of Leda, from a painting on one of the walls representing Leda presenting her children to her husband Tyndareus—and two small bed-rooms. The bed-rooms are in fact always small in these ancient houses—mere cupboards in which people spent as little time as possible. At the left of this garden is a beautiful little fane, dedicated to the Penates, and resembling one of those little shrines placed by the roadside in Roman Catholic countries. On the wall to the right of the columns of the Peristyle is the celebrated painting of the Sacrifice of Iphigenia to be mentioned later on.

This is the photograph of a model of the House of the Tragic Poet as it would appear if restored, in the museum in Naples, and will perhaps give you a clearer idea of the appearance of the whole. Note the vestibule, with its peculiar style of Pompeiian panelling; the Atrium, in two stories, with balcony and rooms for slaves; the painting of Achilles and Briseis; the passage to the Peristyle; the Tablinum; the Triclinium; the little shrine and the painting Iphigenia. Note also the roof of wooden rafters covered with tiles.

The picture now on the screen represents a restoration of the interior of the house as it must have originally appeared. It is correct in almost every detail, as owing to the perfect state in which the building was found, but little need be left to the imagination. Probably the entrance to the Tablinum was closed by a door or curtains. These have been represented as with drawn, and, as will be observed, it is possible from the street to see through the house from end to end, the little shrine at the back of the peristyle being plainly visible. This total want of privacy in such a house is repugnant to our notions of comfort, but it can hardly be denied that there is an air of splendor in the extensive and richly decorated suite of rooms which is scarcely equalled with us in houses of a similar class. It shows the shrine and fine smooth white marble-like stucco, with which the whole interior of the house was covered, and which must have given it a very fresh and bright appearance.

Such then is the plan of the typical Roman house. In primitive times the Atrium, with the few rooms opening off it, constituted the whole house. It was the original Roman house; in fact the house was called Atrium, and we have in Rome the remains of certain very early buildings, which always retained this name, e.g., Atrium Vestæ, the house of the Vestal Virgins and others.

The house took this form partly on account of climatic conditions, which enabled one to live much in the open air, and partly because glass had not been discovered, and light and air could thus only be obtained through the large front door or through the opening in the roof. This Atrium, which was in the earlier times the general meeting-place for the family, was characteristic of the Roman house as compared with the Greek, in which latter there was a separation of the apartments of the men from those of the women. In later times, as the demand for larger and more luxurious houses arose, the Peristyle, with its accompanying rooms, were added, a feature which both in name and position indicates its Grecian origin.

(To be Continued.)

The Gurney Foundry Co., of Toronto, have issued a handsome calendar, with the new Temple Building as the central feature. The calendar calls attention to the fact that this building is fitted up with the company's Oxford radiators.

CORRESPONDENCE.

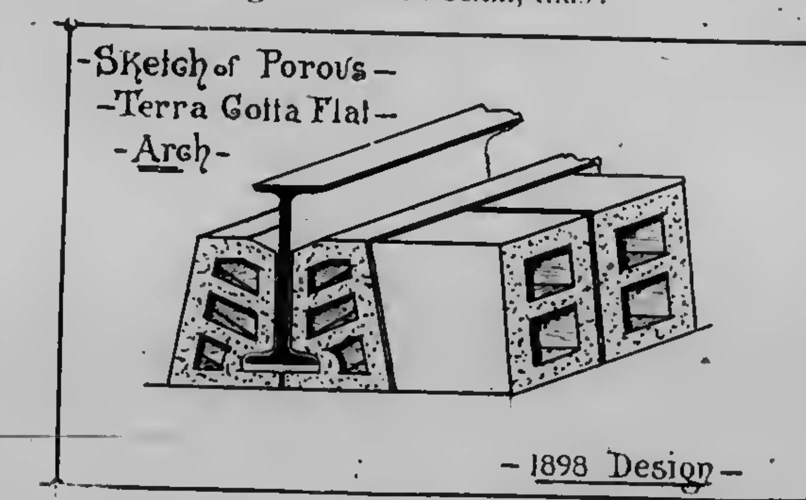
[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

QUALITIES OF FIREPROOFING MATERIALS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Being deeply interested in the question of fireproof construction I have carefully studied the paper prepared by Mr. Burke, "Two Questions in Connection with Steel Construction in Buildings," read at the annual convention of the Ontario Association of Architects. This paper, as stated, was written to open a discussion as to the merits, or de-merits of the different methods in use, and before proceeding to criticize it—and the statements of those who took part in the subsequent discussion—I wish to congratulate him on the skill with which he handled his subject, so far as he carried it—a subject interesting not only to the members of the Ontario Association of Architects, but to all who practice the profession of architecture.

Mr. Burke has apparently taken as his text examples, "Stevenson Constable experiments; Roebling's so-called tests; and the Engineering Record's report of the Pittsburg fire—all useful in their own way—but it is to be regretted that he neglected to emphasize the changes which have been introduced in porous terra cotta flat arch construction within the past eight years, and either must have overlooked or been ignorant of them. Flat arch end construction has superseded all other forms where porous terra cotta is used, and I think supplies the wants of both Mr. Burke and Mr. Curry. They give a level ceiling throughout, the tile being 1¼" thick with an air space of nearly one inch between it and the lower flange of the iron beam, thus:



This form of flat arch was designed and introduced by Mr. Thos. A. Lee, of Denver, Col., and so far back as 1892 proved itself superior to all rivals and competitors, vide the report of the competition test made at Denver, Col., December, 1890. These tests it may be noted were made independently of the competitors by Messrs. Andrews, Jaques, and Rantoul, architects of the Denver Equitable Building Company, the porous terra cotta flat arch defeating all competitors decisively.

Stevenson Constable's experiments (New York, 1896), so far as they went, and even the Pittsburg conflagration, again conclusively proved the superiority of porous terra cotta, the "Engineering News" placing it first. Even H. Maurer & Son, for years the advocates of hard tile, now admit its superiority over all other materials—vide page 24 of their new catalogue, which says, "profiting by that experience (the Denver tests) we have since made all our hollow tile more or less porous." Surely this should convince the most skeptical, providing always he is seeking after the truth.

I would here sound a note of warning! Architects should be careful to note the difference between "hard tile," which is placed on the market under the name of "terra cotta," and "porous terra cotta." More than one manufacturer of the former article now advertises it in such a way as to practically mislead the public, and to make it appear as if they were manufacturing the latter article.

Surely Mr. Burke cannot be in earnest when he advocates a modified form of the "Roebling arch." Many segmental arches have been designed, but so far none of them have found favor with the profession. The latest is probably the "Maurer & Son's arch," vide page 50 of their catalogue. All such arches have been used in combination with concrete (the haunches being levelled up with that material), a practice much to be condemned.

I was under the impression there could be no two opinions as to the use of concrete arches, either flat or segmental, but from remarks passed by members of the Ontario Association of Archi-

tects I find I was mistaken. Evidently—in Toronto if not elsewhere—"a prophet hath no honor in his own country," else the exhaustive experiments made by Mr. J. S. Dobie, grad. S.P.S., could hardly have passed unnoticed by Mr. Burke or some other member of the Association. Read his conclusions and ponder on the same. They are as follows:

"While there is no doubt that a covering of Portland cement concrete will afford some protection to a metal column or girder, still there appears to be no doubt that the concrete itself will be ruined by the action of the fire and will have to be removed as soon as the fire is subdued. The concrete covering may remain upon the ironwork during a fire, but the heat will damage it to such an extent that it will disintegrate afterwards," etc.

"A number of cement briquettes were heated and rapidly cooled by immersion in cold water, after being heated for different lengths of time at different temperatures. In every case the briquette cracked when immersed, and if they were red hot before immersion, they completely disintegrated, in most cases being reduced to a heap of soft mud. Sand and cement acted precisely similarly to the neat ones, and it appears conclusive that if cement or concrete is allowed to become red hot, and is then immersed in cold water, the effect would be ruinous in the extreme.'

Mr. Burke dwells very much on the Roebling test of the Maurer system. Why mention a test conducted by a rival firm? Are such to be accepted? I cannot think any intelligent man would unhesitatingly accept it under such conditions. Is it not strange the Maurer arch only stood the fire test for three (3) hours, when Stevenson Constable reports them as standing during his experiments for six (6) hours uninjured. Nearly twenty days afterwards he loaded this arch up to 1960 lbs. per sq. foot, and it still declined to fall. Why the difference? Roeblings may be able to answer the question.

But let us examine a little further: A Roebling concrete arch was tested by Stevenson Constable in 1896. This arch was loaded to 150 lbs. per sq. foot and subjected to five (5) hours' firing. Upon re-opening the doors before putting water on it; it was seen that all the plaster and wire netting had burned off except in the extreme corners. But note further: "Mr. Constable being restrained from interference," etc. Why should he be restrained? Whom are we to believe; whose report accept; the interested Roeblings or the disinterested Constable? I think there can be no two opinions as to the answer.

Past experience should teach us that hanging tiles, wire and metal lathing and other kindred methods can only result in failure, and I may here say that if the Washington test of "asbestic plaster" was conducted on the same principle as that in Montreal, it is utterly unreliable—that in the latter city being a perfect farce in so far as testing the material went. I question if any architect would take the responsibility of using metal lath, hanging tiles, or even asbestic plaster as the only protection were he constructing a fireproof building.

For nearly twelve years I have studied and experimented with different materials for fireproofing. I have had unusual facilities and opportunities for posting myself on the different systems—past and present—used in Europe and America, but have yet to find a material which has the fire-resisting qualities of porous terra cotta. My own opinion, gained from a large experience, is that no concrete, or all-plaster system is safe, and I heartily endorse the action of the Board of Examiners of New York in their condemnation of concrete. It was well founded; and unless adhered to, may sooner or later lead to disastrous results.

Yours very truly,
N. T. GAGNON.

THE ONTARIO ASSOCIATION OF ARCHITECTS AND WHAT IT SHOULD DO.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—The proceedings of the tenth convention of the Ontario Association of Architects as reported in the CANADIAN ARCHITECT AND BUILDER seem to show that organization to be suffering from nervous prostration in an aggravated form. This association, called into existence with the avowed intention of seeking legislation to enable it to restrict the practice of architecture, has made a long and manful fight of it. Relinquishing one point or another in the proposed Bill as the years passed, it has been consistent to the last in seeking for its members legal recognition and a status denied to outsiders.

That the promoters of this idea of seeking legislation were acting in what they believed to be the best interests of the profession, there is no doubt. They felt at the outset that public opinion was not ripe for the passing through the Legislature of such a measure as was desired; and so the "campaign of education," which has been carried on for years, was begun with high hopes. In this campaign the architects in their wisdom sought to disguise the real object of the Bill—which was, of course, the advancement of the profession—and to make it appear that the prime motive of its authors was the protection of the public. This was not quite sincere; and unfortunately such arguments as can be adduced to show that such legislation as was proposed would afford real protection to a suffering public, are not quite conclusive. For instance, let me quote from the CANADIAN ARCHITECT AND BUILDER for February, 1898:

"Even the terrible calamity at London has not taught the average man common sense. From the papers we find that in several instances the advice of incompetent parties has been asked as to the safety of public buildings. Every man who calls himself a builder or an architect is not a safe or reliable authority upon construction. The Ontario Association of Architects have been doing their utmost to obtain from the Ontario Legislature such changes in their Act as would to some extent protect the public against the possibility of such accidents as the London disaster."

Now, permit me to ask, to what extent would such legislation as the association has been seeking furnish safeguards against the occurrence of catastrophes such as that at London? If the Ontario Architects' Act had been amended as the architects desired, it would now be illegal for anyone beginning practice to style himself an "architect" unless he had passed a prescribed examination. Let it be granted that this examination be such that no one could pass it without proper knowledge. Let it also be assumed that the incompetents already in practice, and on that account, not to be forbidden the use of the word "architect," have died or gone to the United States. Most architects know that in building operations accidents, slight or serious, are due quite as often to carelessness or oversight as to incompetence. That an architect has had at some time in his life, or even that he still has, a proper knowledge of construction, is very far from being a guarantee that no accidents can happen in connection with work with which he has to do. And, even suppose the association could guarantee its members to be architects who are not only competent, but careful, conscientious, never overworked, nor fond of modes of construction too economical to be quite safe—in short, guarantee them to be infallible—what of the other fellows who are not "architects," but who would still have a right to build and might find occasion? Their structures, of course, might be placarded "Unlicensed and Irregular," and the public thus warned when to dodge. But, seriously, is it any wonder that the "average man" is suspicious of legislation which seems so ill-adapted to the ends professed to be had in view; or, that by advancing such arguments, the association has signally failed to create a sentiment in favor of its demands?

The truth is, this whole movement for legislation has been rather petty in its aim and not too farsighted. The proper sphere of action for an architects' society lies along other lines. In the purchase of a library, and in the institution of examinations, the association has done work much to its credit, work that has been of real value to junior members of the profession. What the architects of Ontario need is not legislation to protect them or the public, but grace to see that they have embraced an art and profession which is rich in interest, which has fields for study that are very broad, and in the practice of which, even at this time and place, it is possible to preserve some germs of what really is "Architecture."

So much for the profession; and, if the association really wants to do a public service, here's a "tip":

Toronto either has no proper building laws, or they are not enforced. Because the amended Ontario Architects' Act would afford the public no adequate protection against dangers from panics, fires, or falling buildings, it does not follow that the public should not be protected. There is in Toronto at least one theatre—and that a much frequented one—in which the size and arrangement of exits is such that its use is a constant menace to public safety. And I believe this theatre is not much worse in this regard than are some other buildings in Toronto where crowds assemble from day to day. Such an organization as the Ontario Association of Architects has it in its power to create such an agitation as would lead to the establishment in Toronto—and what is said of Toronto of course applies to other cities in Ontario—of effective building laws compiled by experts, and a Department of Buildings competent to secure their strict enforcement. Such a Building Department as New York City has, Toronto should have—if on a smaller scale.

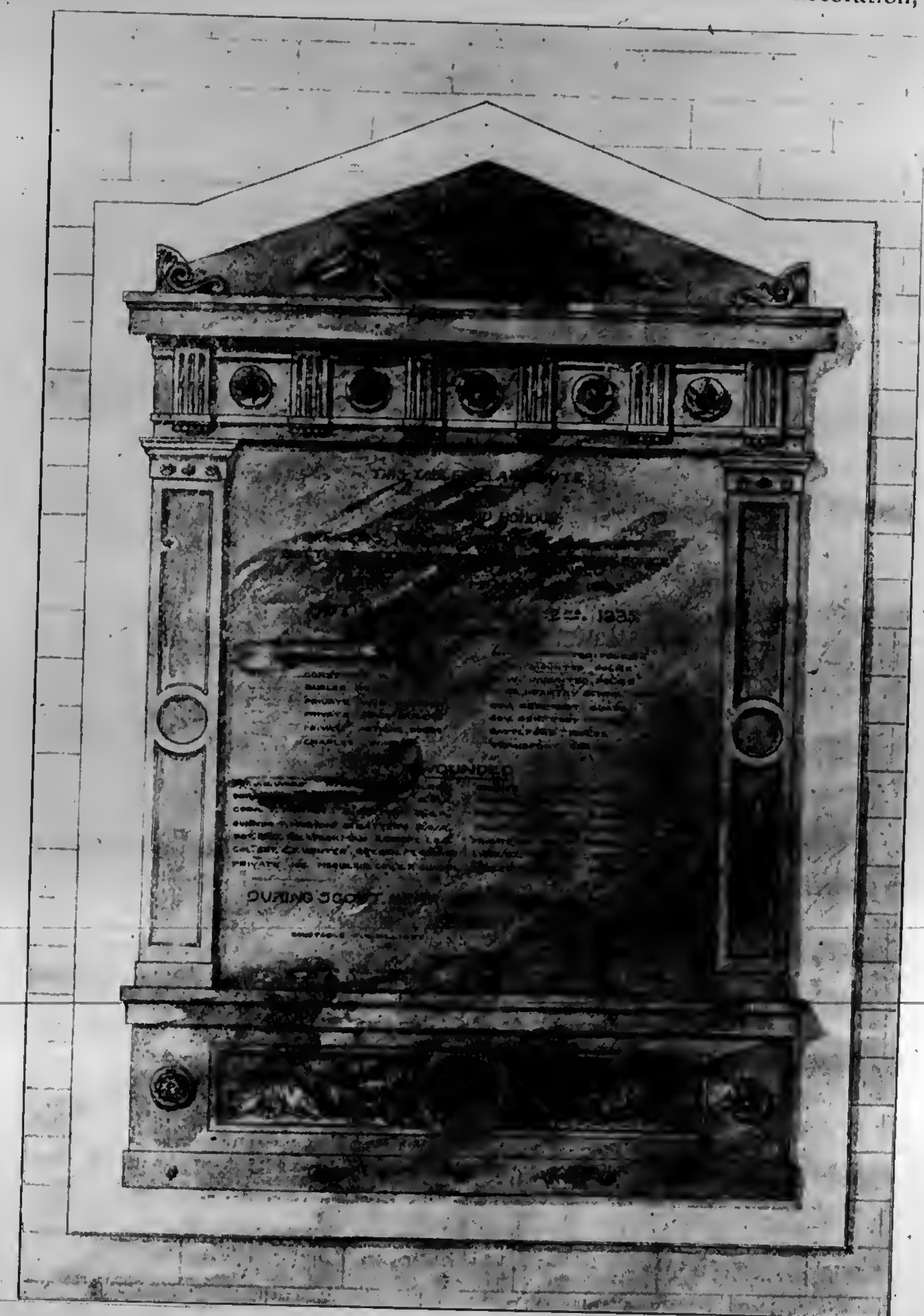
Let the Ontario Association of Architects urge the adoption of such practical means for securing the public safety as have been found effective in New York and elsewhere, and it will prove itself worthy of all support. Let it wait for another London disaster to occur in Toronto or somewhere else, and then through its convention, or its organ, prate about a Bill to restrict the use of the word "architect," and it will not command the respect of

Yours truly,
ARTHUR E. WELLS.

BATTLEFORD MEMORIAL TABLET.

WE reproduce on this page the design for a memorial tablet to be erected in the Toronto armories by the Battle Column Association, in honor of their comrades who were killed or wounded during the campaign of 1885. The design is the work of Mr. C. D. Lennox.

The tablet will be about three feet wide by 5 feet high, cast in bronze, out of a bronze field piece donated for the purpose by the militia department, backed by a large marble slab, and having in addition to the names of the killed and wounded, medallions showing the regimental badge or inscription of the various corps



comprising the Battleford column. The estimated cost is about $200.

SANITARY MATTERS ON THE COAST.

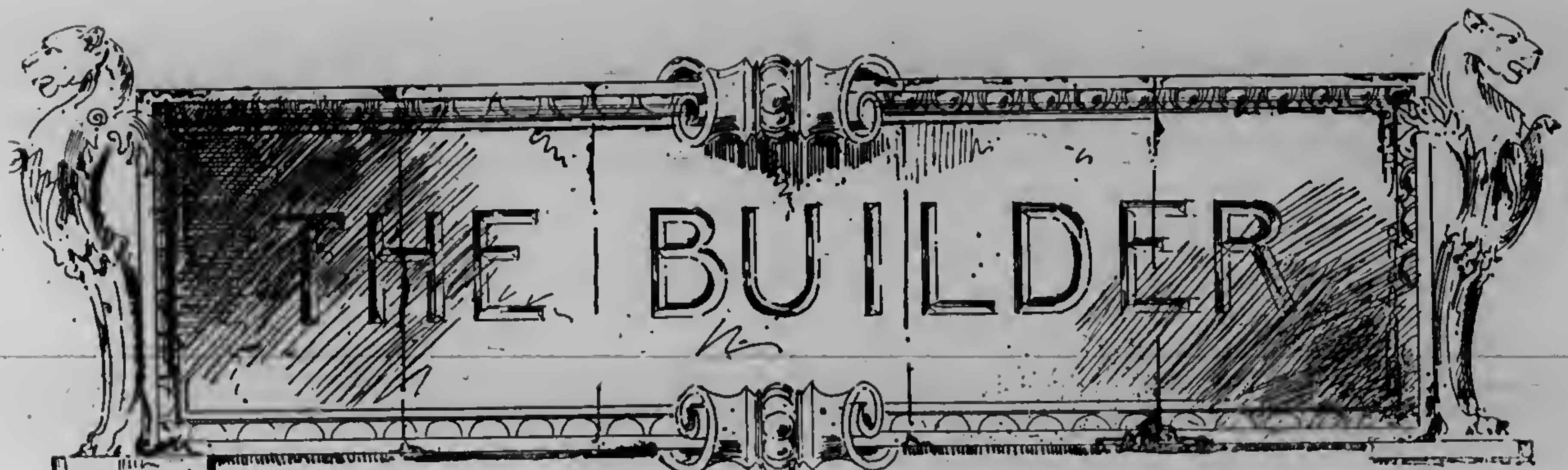
MR. GEO. WATSON, plumbing and sewer inspector, of Victoria, B. C., in his annual report to the city engineer, for the year 1897, suggests that the provisions of the by-law be made more definite in order that the occupants of the Chinese quarter may be compelled to observe the sanitary regulations. It is also recommended that provision be made for an examination of all journeymen plumbers. The report states that under present conditions the inspector is at times obliged to issue permits for plumbing to persons who are known to be incapable of doing the work properly.

THE TORONTO GUILD OF CIVIC ART.

THE charter granted by the Province of Ontario to the Toronto Guild of Civic Art states that it is the purpose of the Guild to act as a purely supervising, consulting and advisory body to promote and encourage civic art, including mural painting and decoration, sculptures, fountains and other structures or works of art or of an artistic character; and to arrange for the execution of works of art by competent artists, to be chosen by competition or otherwise; and to hold exhibitions from time to time of works of art more especially connected with mural decoration, architectural and stained glass designs, sculpture and kindred subjects; and for the said purpose to appoint an advisory board to carry out the objects of the Guild, with powers to be declared by by-law, provided that in all matters the services of the advisory board shall be without remuneration; under the name of "The Toronto Guild of Civic Art."

Mr. B. E. Walker, manager of the Canadian Bank of Commerce, is the president, and Mr. W. A. Langton, Registrar of the O. A. A., secretary of the Guild, from whom any desired particulars may be obtained.

The Guelph Foundry Co. has been formed to manufacture hot blast furnaces, etc., for which purpose the company are fitting up with improved machinery the Gowdy foundry.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Estimating For Shingles.

THE average width of a shingle is four inches. Hence when shingles are laid four inches to the weather, each shingle averages sixteen inches, and 900 are required for a square of roofing.

If laid 4½ inches............800 per square.
" " 5 " ....720 " "
" " 5½ " ....655 " "
" " 6 " ....600 " "

This is for plain gable roofs. In hip and valley roofs when the shingles are more or less cut to meet the conditions, add 5 per cent. to the foregoing figures. A carpenter will carry up and lay in the roof from 1,500 to 2,000 shingles in a day of 10 hours, or 1½ to 2 squares of plain gable roofing, so that the art of shingling at the present rate of wages may be put down at $1.00 per square, exclusive of cost of material, scaffolding and nails. To lay down roof boards and carry to roof is worth about 25 cents per square, and to cut and place rafters is worth about the same, i. e., 25 cents per square. This would make the total cost for labor $1.50 per square. This, of course, is calculated for buildings up to 2½ stories high. Buildings more than that will cost for roofing, 5 per cent. more per square for each additional story.

Hints For Painters.

FEW painters know, with anything like exactness, the amount of paint required to cover a given surface, and this lack of knowledge often leads to disastrous results in estimating. It may be well to give a few facts that have been arrived at by experience. A gallon of well mixed paint will cover from 450 to 630 superficial feet of wood. On a well prepared surface or iron the gallon will cover 720 feet. In estimating painting over old work, the first thing to do is to find out the nature of the surface, whether it is porous, rough or smooth, hard or soft. The surface of stucco, for example, will take a great deal more paint than wood, much depending on the circumstances—whether it has been painted and what state the surface is in. A correct estimate of repainting woodwork CANNOT be made from the quantities only; a personal examination ought to be made in every case where there is much work to be done. Trusting to quantities or measurements alone will only tend to lead the contractor into a trap; there are so many unforeseen conditions cropping up all the time that the painter should see the locality and the work to be painted, when such is possible, before he gives in his figures for the work. There is painting and painting; it can be done well and it can be done indifferently, and no other trade will admit of greater scamping, and, unfortunately, in this country, low prices, bad estimating and unprincipled competition, have done much to bring into disrepute a very respectable calling. A slovenly inartistic painter will often repaint and regrain on work that ought to be well rubbed with pumice stone or sand paper before the first new coat is laid, but the work goes on without even cleaning or stopping, and the result is a bad name for painters all round. In three coat work the following amount of materials will be required to cover 100 superficial feet of new woodwork: Paint, eight pounds; boiled linseed oil, three pints; spirits of turpentine, one pint. The work, to do it as it should be done, will require over two days for one man. According to an authority forty-five yards of first coat, including stopping, will require five pounds of white lead, five pounds of putty, and one quart of linseed oil. Painting, when done well, and the best materials are employed, should remain fresh and good for seven years, but the most done now-a-days does not last over four. It pays both owner and painter better to have the work done well at a good price, and good materials employed, as the work lasts so much longer and is much more satisfactory.

Proportion of Doors.

As a rule, everything being equal, single doors for dwellings should be as 2 is to 5, and to entrance doors for buildings intended for public use they should be as 1 to 2. If the width is given and the height required of a door for a dwelling, multiply the width by 5 and divide the product by 2; but if the height is given and the width required divide by 5 and multiply by 2. When two or more doors of different widths show in the same room, it is well to proportion the dimensions of the more important by the above rule, and make the narrower doors of the same height as the wider ones, as all the doors in a suit of apartments, except the folding or sliding doors, have the best appearance when of one height. The proportions for folding or sliding doors should be such that the width may be equal to four-fifths of the height, yet this rule needs some qualification, for if the width of the opening be greater than one-half the width of the room, there will not be sufficient space left for opening the doors, also the height should be about one-tenth greater than that of the adjacent single doors. Where doors have but two panels in width the stiles and muntins should be one-seventh the width, or whatever number of panels there may be, the united width of the stiles and muntins should occupy three-sevenths of the width of the door. Thus, in a door thirty-five inches wide, containing two panels in width, the stiles should be five inches wide, and in a door three feet six inches wide the stiles should be six inches wide. If a door three feet six inches wide is to have three panels in width the stiles and muntins should be 4½ inches wide, each panel being eight inches wide. The bottom rail and the lock rail ought to be equal in width to one-tenth of the height of the door, and the top rail, and all other rails, of the same width as the stiles. The mouldings in the panels should be one-quarter the width of the stile. Doors made of these proportions are always well balanced, and whether ornamental or not always have a graceful appearance. Doors should always be hung so as to open into the principal rooms, and, in general, no door should be hung to open into a hall or passage. As to the proper edge of the door on which to affix the hinges, that will depend altogether on conditions, as some doors may be finished on one side with mouldings in the same style as the finish in the room, while the other side may be finished in some other style, or be devoid of mouldings altogether, and again, something depends on which side of the frame and on which jamb the door must be hung on. These conditions render it impossible to lay down any fixed rule defining the edge of door on which the hinges must be affixed.

Scribing.

THE operation of scribing, to be done properly requires some skill and care. Its object is to bring the edge of one piece of wood to fit close up to an irregular surface. Thus, in putting down base boards round a room, not only when first down, but often after the shrinkage of the joists and the floor, or sagging of the timbers, when gaps will be left between the lower edge of the base board and the floor, the work of laying base may have to be done a second time, when scribing will be necessary to fit the base close to the floor. The operation of scribing is as follows: The base board having been placed in position with its upper edge to a true line, a pair of suitable compasses is taken and opened to the greatest distance that the lower edge of the base board is anywhere from the floor. One point of the compass is often drawn along the floor, keeping the joint of the compass as near to a given angle with the floor as possible, whilst the other point is made to scratch a line on the face of the base board, which line will, of course, be exactly parallel with the floor line, and to this line made on the base board, must the work be done. The superfluous wood may be removed either by ripping with a saw or by use of the draw-knife.

Slag bricks are now being made in many parts of Germany by a method recently described by Herr Lurman. Briefly, the molten slag is discharged direct from the furnace into a tank of water. The slag here crumbles to pieces, and part of the siliceous acid it contains is dissolved in water. To this mass there is added a portion of finely ground slag and about 10 per cent of slaked lime. About six or eight days are required for the mixture to harden, and this it is left to do in moulds of suitable shape, under pressure applied either with a hand or steam-worked toggle-joint lever. The strength of the bricks produced is about the same as that of ordinary burnt-clay bricks. For flue and chimney building they are specially adapted by reason of their heat-resisting qualities.

Remember, it is advertising ink that makes the public read and think, and turns the buyers' feet and face directly towards your business place. Therefore, if you have anything to sell, in advertising ink display it well.

PROMINENT CANADIAN CONTRACTORS.

VIII.

THE LATE MR. SYLVESTER NEELON.

WE present herewith a portrait, with some particulars, of the late Mr. Sylvester Neelon, of St. Catharines, contractor for the masonry of the new municipal buildings, Toronto, whose death was recently recorded in these columns.

The late Mr. Neelon was born at Sackett's Harbor, State of New York, in 1825, and while very young removed with his parents to Port Dalhousie, at the lower end of the Welland canal, where he attended the village school. As a lad his first employment was found on board a timber vessel. In a short period he had attained the rank of mate, then of captain, in which capacity he sailed the lakes for many years. He afterwards formed a partnership with the late James Norris. The firm engaged in building and buying boats and in freight transportation on the upper lakes and Welland canal to lower lake ports and Montreal. They were the first to adopt the towing of vessels by tug or steamer on the lakes. In these enterprises they amassed a large amount of money and property. The firm dissolved in 1869.

THE LATE MR. SYLVESTER NEELON.

Mr. Neelon was afterwards extensively engaged in the grain and flour milling, shipping and ship-building, and other lines of trade.

In the year 1885 Mr. Neelon went into contracting, building a number of sections of railway. He was the principal agent in the construction of the Niagara Central railway, into which he put a large amount of money. He was associated in large contracts both in the United States and Canada, and in connection with the late John Elliott, took the contract for the masonry in connection with the erection of the new municipal buildings at Toronto. Mr. Elliott's death occurred in the early stages of the work. Afterwards there arose the dispute between Mr. Neelon and the architect regarding the quality of the stone, resulting in the dismissal of the contractor and the assumption of the work by the city under the direction of the architect, with the particulars of which our readers are already familiar. This and other business complications in which he became involved, filled with trials the later years of his life.

Notwithstanding the extent of his private business enterprises, Mr. Neelon evinced a deep interest in the welfare of the city in which he lived. For many years he was a member of the city council, and also represented the county two terms in the provincial legislature,

ORGANIZATION OF THE LONDON BUILDERS' EXCHANGE.

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Added to his efficient workmanship, Mr. Jeffery has displayed in all his business transactions those sterling qualities of fair dealing, and a watchful care over all the details of his business. By the practice of these principles, he has earned for himself a reputation that any contractor might be proud of. He is very enthusiastic in Excange matters. With such a pilot at the helm, the London Builders' Exchange will soon reach the point where mutual goodwill and perfect confidence will characterize all transactions between its members.

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TESTS OF CAST-IRON COLUMNS BY THE DEPARTMENT OF BUILDINGS OF NEW YORK CITY.*

WE present herewith a report of the tests of full-sized cast iron columns recently conducted by the Department of Buildings of New York city at the works of the Phoenix Bridge Co., Phoenixville, Pa., under the direction of Mr. W. W. Ewing, of the Department. The tests began on Dec. 15 at 1 p.m., and were finished on Dec. 21. The machine used was the well-known hydraulic testing machine, at the Phoenix works. It is the most powerful testing machine in the world. To ensure the accuracy of the tests, the Building Department arranged a comparison of the Phoenix machine with the famous Emery machine in the U. S. Arsenal, at Watertown, Mass. On Dec. 30-31, 1896, a series of compression tests was made at Watertown upon a soft steel Phoenix column built by the Phoenix Iron Co., especially for these tests. It was made of eight segments riveted together, forming a round column 21 ft. long, inside diam. 14⅝ ins., thickness of metal 1⅛ ins., area of section 75.3 sq. ins., total weight of 5,485 lbs. The calculated safe load was 530 tons. The column was shipped to Watertown Arsenal and carefully tested in the government machine shops at that place. Marks were made 26 ins. from the ends, that is, 200 ins. between marks, and a form of roller extensometer (Fig. 1), reading to 1-10,000 in., was employed, to take all measurements. In applying the load constant increments were used. Certain additional loads were applied, corresponding with those to be applied later in the Phoenix machine. The column was then returned to Phoenixville, and the tests repeated in the Phoenix machine. The conditions were reproduced as nearly as possible; the same series of readings were taken, using the same extensometer. The results of the two tests are shown in Tables I. and II.

The gage used to calibrate the Phoenix machine was a mercury column instrument, manufactured by Thomas Shaw, of Philadelphia, Pa., and numbered 5447, was calibrated to read in pounds per sq. in., and ranged from 0 to 220 lbs. Fig. 2 is a sectional view of the lower portion of the gage. The pressure used in the cylinder of the hydraulic testing machine is received on a diaphragm (f) and transmitted to the lower end of the double-headed piston (h), whose upper end, of much greater diameter, is surmounted by another diaphragm, above which is a reservoir of mercury (i), and a mercury column of small bore (g). The actual

FIG. 1.—READING END OF THE ROLLER EXTENSOMETER EMPLOYED IN THE CALIBRATION WORK.

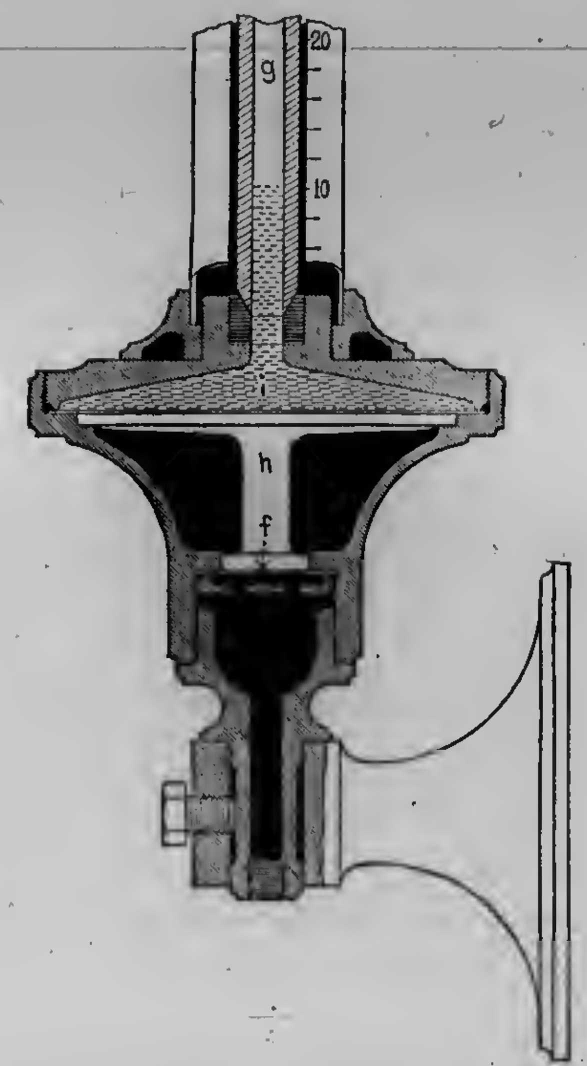


FIG. 2.—SECTIONAL VIEW OF THE SHAW MERCURY GAUGE USED AT PHOENIXVILLE.

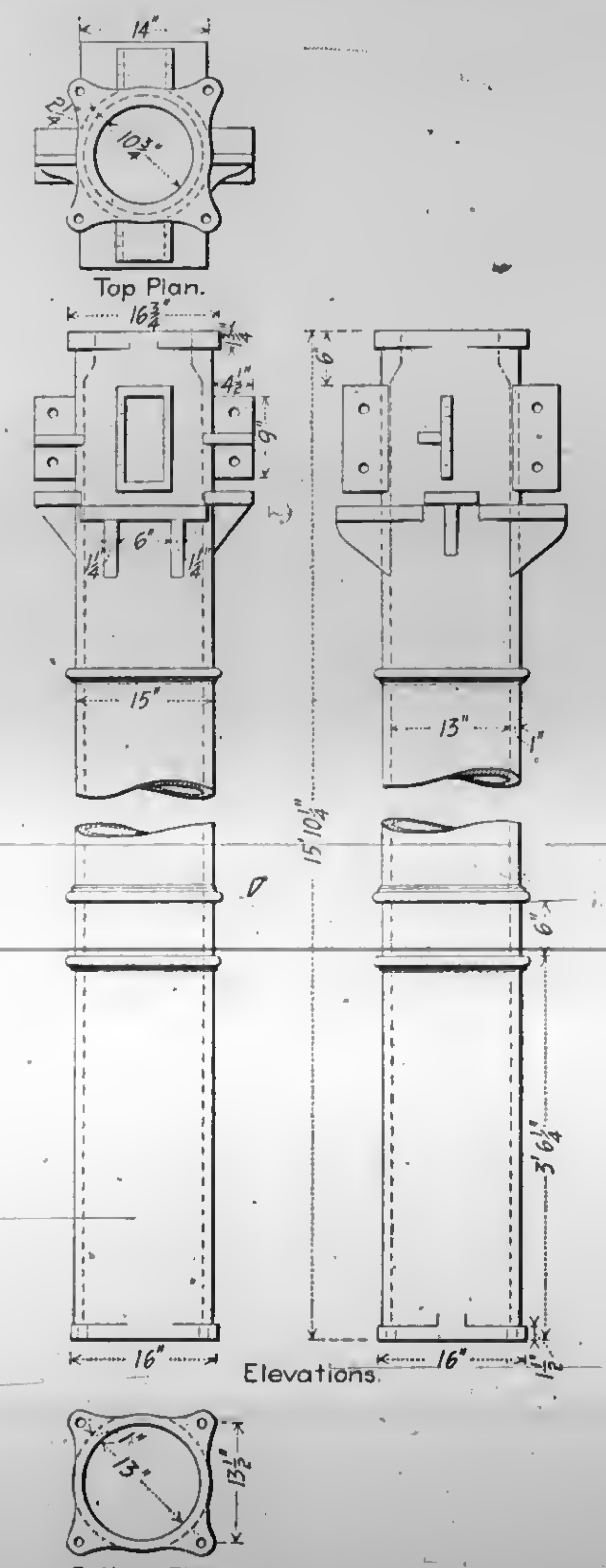


FIG. 3.—DETAILS OF THE 15 IN. COLUMN.

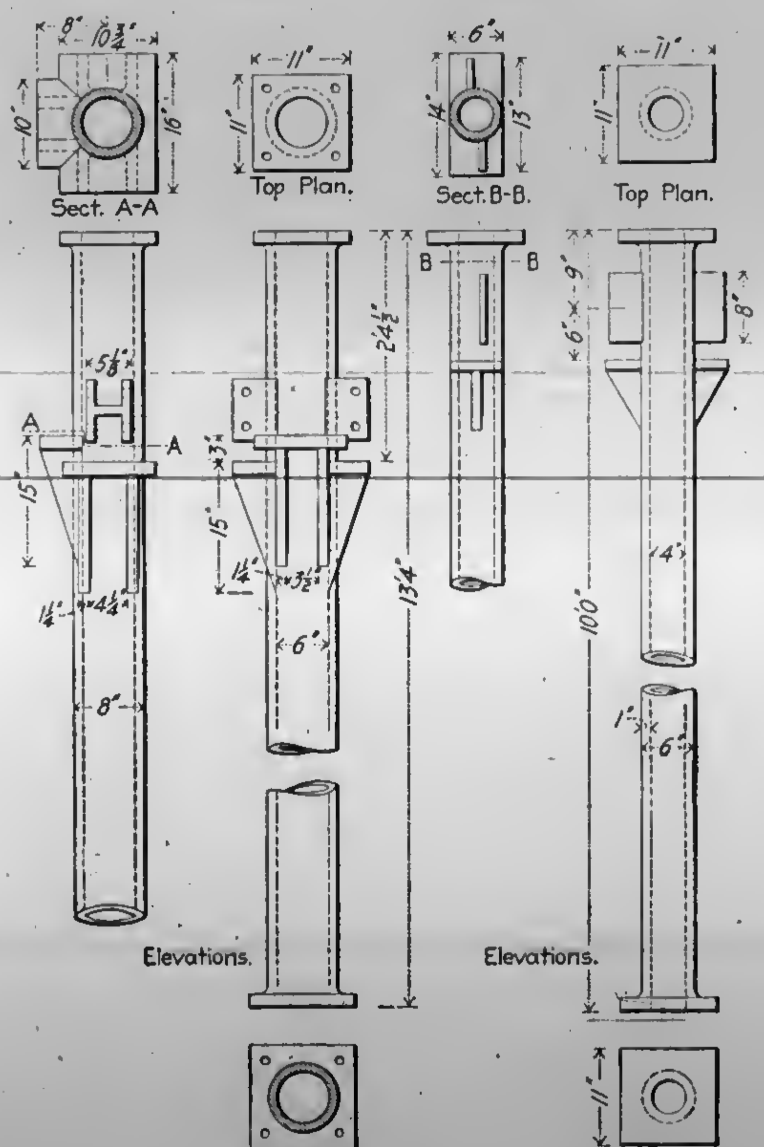


FIG. 4.—DETAILS OF THE 6 IN. AND 8 IN. COLUMNS.

* Reprinted from Engineering News, New York.

tests were made with a higher reading mercury column, which was compared with instrument No. 5447 at the time of the tests, and afterwards by the maker of both instruments. The values in Tables I. and II. have been corrected in accordance with the result of the calibrations.

From the figures given in Tables I. and II. the following computation of the calibration of the Phoenix testing machine was made and included in Mr. Ewing's report:

Let P = unit load in Watertown machine.

I = compression in ins. due to P.

P' = unit load in Phoenix machine.

I' = compression in ins. due P'.

$P = 1$ lb., $I = .0000000891$, and $I' = .0002432916$.

If $P : P' = I : I'$,

then $\frac{P}{P'} = \frac{I}{I'}$ and $P' = \frac{P\,I'}{I}$.

$$P' = \frac{.0002432916}{.0000000891} = 2{,}730.54 \text{ lbs.}$$

This figure indicates that each unit on the gage must be multiplied by 2,730 to obtain the pressure exerted in lbs.

We would call especial attention to the importance and value of he above test as furnishing for the first time, so far as we are aware, an active calibration of the Phoenix hydraulic machine.

According to the illustration of the Phoenix machine in our issue of Jan. 10, 1891, the hydraulic cylinder is bored to a diameter of 64.1 inches. This is equivalent to an area of 3,227 sq. inches. If there were no friction in the machine and no error in the Shaw mercury column gage, then 1 lb. pressure per sq. in. indicated on the gage would represent a load of 3,227 lbs. on the testing machine, instead of 2,730 lbs., the figure given by Mr. Ewing. The difference, 497 lbs., is 15.4% of 3,227, which may be taken as the average friction of the machine plus the error, if any, of the gage.

In the tests made at Watertown (Table 1) there were 36 readings taken, in nine different tests, in which the increment of load was uniformly 80,675 lbs. The corresponding compressions ranged only from .0070 to .0074, a variation of .0004. An inspection of the figures seems to indicate that this variation was that of the measuring instrument and of the personal equation of the observer, rather than an error in the recording of the load by the testing machine, or a variability in the action of the column being tested. The differences in the recorded compressions due to the first applied load, 161,150 lbs., in the nine tests, ranging from .0057 to .0091 inch, is probably an error in the setting or in the zero reading of the measuring instrument, which error remained practically conscious during each one of the tests, and does not affect the increments of loads after the first load.

In the calibration of the Phoenix machine the compressions due to increments of 25 units on the gage (or 25 × 2,730 = 68,250 lbs.), range from .0054 to .0065 inch, a difference of .0011, which is nearly three times the range shown in the Watertown tests for an increment of load 80,675 lbs. If we assume that the whole range of difference found in the Watertown tests, .0004 in., is the error

TABLE I.—Tests of Phoenix Column in Watertown Machine, Dec. 30—31, 1896.

No.	Total load, lbs.	Compressions in ins. No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.
1.	161,150	0.0091	0.0088	0.0084	0.0081	0.0085	0.0068	0.0057	0.0058	0.0057
2.	322,700	.0233	.0229	.0226	.0221	.0220	.0207	.0200	.0199	.0200
3.	403,375	.0304	.0302	.0298	.0292	.0292	.0278	.0272	.0272	.0271
4.	484,050	.0375	.0372	.0370	.0365	.0364	.0349	.0345	.0345	.0345
5.	564,725	.0446	.0444	.0441	.0437	.0435	.0420	.0418	.0417	.0418
6.	645,400	.0519	.0518	.0515	.0510	.0506	.0493	.0490	.0490	.0490
7	763,720	.0626	.0625	.0622	.0617	.0613	.0600	.0597	.0597	.0597

Differences.

Nos.	Loads, in lbs.	Compressions in ins.								
1—0.	161,150	0.0091	0.0088	0.0084	0.0081	0.0085	0.0068	0.0057	0.0058	0.0057
2—1.	161,550	.0142	.0141	.0142	.0141	.0135	.0139	.0143	.0141	.0143
3—2.	80,675	.0071	.0073	.0072	.0071	.0072	.0071	.0072	.0073	.0071
4—3.	80,675	.0071	.0070	.0072	.0073	.0072	.0071	.0073	.0073	.0074
5—4.	80,675	.0071	.0072	.0071	.0072	.0071	.0071	.0073	.0072	.0073
6—5.	80,675	.0073	.0074	.0074	.0073	.0071	.0073	.0072	.0073	.0072
7—6.	118,320	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107

Average differences.

Nos.	Loads, lbs.	Compressions, ins.	Compression in ins. per lb.
2—1.	161,550	0.014,066,66	0.000,000,087,0
3—2.	80,675	.007,177,77	.000,000,088,9
4—3.	80,675	.007,211,11	.000,000,089,3
5—4.	80,675	.007,177,77	.000,000,088,9
6—5.	80,675	.007,277,77	.000,000,090,2
7—6.	118,320	.010,700,00	.000,000,090,4

Average compression in ins. per lb. of load, 0.000,000,089,1.

TABLE II.—Tests of Same Phoenix Column in Phoenixville Machine, Dec. 15—16, 1897.

No.	Loads, gage read'g.	Compressions in ins. No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
1.	60	—0.0095	—0.0091	—0.0097	—0.0090	—0.0098	—0.0080	—0.0096	—0.0089
2.	100	.0003	.0004	.0002	.0005	.0003	.0005	.0002	.0007
3.	125	.0059	.0061	.0059	.0062	.0057	.0062	.0060	.0063
4.	150	.0118	.0122	.0118	.0123	.0117	.0122	.0117	.0122
5.	175	.0181	.0186	.0170	.0187	.0180	.0187	.0182	.0188
6.	200	.0235	.0247	.0237	.0248	.0238	.0247	.0240	.0247
7.	220	.0292	.0303	.0288	.....	.0289	.....	.0289	.....

Differences.

Nos.	Loads, scale divisions.	Compressions in ins.							
1—0.	60	0.0095	0.0091	0.0097	0.0090	0.0090	0.0080	0.0096	0.0089
2—1.	40	.0098	.0095	.0099	.0095	.0099	.0094	.0098	.0096
3—2.	25	.0056	.0057	.0057	.0057	.0054	.0057	.0058	.0056
4—3.	25	.0059	.0061	.0059	.0061	.0060	.0060	.0057	.0059
5—4.	25	.0063	.0064	.0061	.0064	.0063	.0065	.0065	.0066
6—5.	25	.0054	.0061	.0058	.0061	.0058	.0060	.0058	.0059
7—6.	20	.0057	.0056	.0051	.....	.0051	.....	.0049	.....

Average differences.

Nos.	Loads, scale divsn.	Compressions, ins.	Compression in ins. per unit of gage rdg.
2—1.	40	0.00967	0.000,241,75
3—2.	25	.00565	.000,226,00
4—3.	25	.00595	.000,238,00
5—4.	25	.00639	.000,255,6
6—5.	25	.00586	.000,234,4
7—6.	20	.00628	.000,264,0

Average compression in ins. per unit of gage reading, 0.000,248,291,6.

TABLE III.—RESULTS OF BREAKING TESTS OF CAST-IRON COLUMNS.

Column No.	Length.	Outside Diameter.	Thickness. Maximum.	Least.	Average.	Location of break	Breaking load lbs.	Compression.	Character of metal at fracture.	Remarks.	Sectional area, sq. in.	Breaking load per sq. in. of area, lbs
I.	190¼ ins.	15 ins.	1	1	1	About 3 ft. 4 ins. from bottom.	1,356,000	....	Medium grain; blowholes and dirt.	One place foundry dirt extended half way through; another pla e foundry dirt and honeycomb between inner and outer surface.	43.98	30,830
II.	190¼ ins.	15 ins.	1 5-16	1	1⅛	Bet. 1 and 5 ins. from bottom.	1,330,000	....	Medium grain; fairly uniform, spots of dry dirt.	At a pressure of 1,302 000 a slip of some kind occurred, which dropped the pressure to 1,275,000; again run up until break occurred. Upper portion sprung ½-in. in 9 ft. 4 ins.	48.03	27,700
B 2.	190¼ ins.	15 ins.	1¼	1	1⅛	Bet. 3¼ ft. from bot'm and 6½ ft. from top.	1,198,000	2½ in., bet. 150,000 and 1,108,000.	Coarse, but uniform; a few flaws.	At 1,108,000 column sprung badly, Fig. C; movement recorded under compression	48.03	24,900
B 4.	190¼ ins.	15⅛ ins.	1 7-32	1	1⅛	Bet. bot'm and one-third up from bottom.	1,246,000	2¼ in., bet. 150,000 and 1,246,000.	Coarse in centre; finer on outside; cinders and slag.	Bad spots, cinder pockets and blowholes near middle of column; small cracks in necking near top; column given a permanent set.	49.48	25,200
5.	190¼ ins.	15 ins.	1 11-16	1	1 11-64	At bottom flange.	1,632,000	2 5-16 in. in 8 ft. 3 in.	Fine grain and uniform where no flaws occurred.	Flaws and foundry dirt at point of break; load was carried as high as 1,804,000. The dummy head against which column rested was found broken after the test; this may have had something to do with character of break.	50.84	32,100
6.	190¼ ins.	15 ins.	1¼	1⅛	1 3-16	No break; permanent set of 1 3-16 ins. in 8 ft.	Over 2,082,000	⅜ in. bet. 232,000 and 1,108,000.	No break.	Pressure run up to 1,108,000 and released. It was again run up to 2,082 000, released and run up to 2,033,000. Column could not be broken; capacity machine reached.	51.52	Over 40,400
XVI.	160 ins.	Bet. 8¼ and 7¾ ins.	1¼	⅝	1	Where chaplet was placed at middle, and at ends.	651,000	....	Metal g'd; medium grain.	At time of breaking, column had a vertical deflection of 3 9-16 ins. and a horizontal deflection of 1⅛ ins.; fracture seemed due to flexture.	21.99	31,900
XVII.	160 ins.	8 ins.	1 3-32	1	1 3-64	At middle and ends.	612,800	....	Fine grain, uniform and free from flaws.	Vertical deflection 4¼ ins.; horizontal, 7-32 in.	22.87	26,800
7.	120 ins.	6 1-16 ins.	1 5-32	1⅛	1 9-64	At middle and each end.	400,000	....	Good even gr'n, no flaws.	Vertical deflection, 3¼ ins.; horizontal deflection, 1 11-32 ins.	17.64	22,700
8.	120 ins.	6 3-32 ins.	1⅛	1 1-16	1 7-64	At middle and each end.	455,200	....	Fine grain, uniform and free from flaws.	Vertical deflection, 3 ins.; horizontal deflection, ⅞ in.	17.37	26,300

TABLE IV.—COMPRESSION TESTS OF CAST-IRON COLUMNS MADE FOR THE DEPARTMENT OF BUILDINGS, NEW YORK CITY, IN 1896, BY GUS. C. HENNING, M. AM. SOC. M. E.

No.	Length.	Outside Diameter, Ins.	Thickness. Maximum.	Minimum.	Average.	Breaking Load, Actual Gauge-Reading, Lbs.	Sectional Area, Sq. Ins.	Breaking Load, per Sq. In., Lbs.	*Corrected Breaking Load per Sq. In.
1	147¾ ins.	8	13-16	⅝	¾	520,000	17.08	30,100	25,840
2	150 "	9	1⅛	¾	1	630,000	25.14	25,100	21,340
3	162 "	12	1	1	1	1,250,000	34.55	36,200	30,770
4	159¾ "	14	1⅛	¾	1	1,226,000	39 84	30,700	26,100

* The figures in this column are obtained by deducting 15% from those in the preceding column, for friction of the machine.

of the measuring instrument and the personal equation in reading it, and subtract it from .0011 in., the difference, .0007 in., seems to be due to a variable error, due to variable friction, in the Phoenix machine. Taking the compressions due to an increase of the load from 100 to 200 on the gage (Table II), or 273,000 lbs. in 10,000ths of an inch, we find that in the eight tests they were,

FIG. 5.—COLUMN B 4. SHOWING FRACTURE NEAR CENTRE.

respectively, 232,243, 235,243, 235,242, 238,240, averaging .02385 in.; the lowest figure (232) being .00065 in., or nearly 3% below, and the highest (243), .00045, or 2% above the average. The figure .02385 ÷ 100 = .0002385 in., seems to us to be a more correct figure for the average value of the compression due to the unit gage reading, than the figure .000243 given in the report, and this figure gives 2,675 lbs. instead of 2,730 lbs. as the load corresponding to a 1 lb. pressure per sq. in. per division recorded on the gage. Comparing this value with the area of the cylinder of the testing machine 3,227 sq. ins., gives an average friction of 17.1%, instead of 15.4%, as computed above. According to the calibrations the friction may vary from the average as much as 3% in the case of loads of 273,000 lbs., the variable percentage being greater the smaller the load. The figure of 2,730 lbs. given in the Building Department report, may be accepted as being probably the highest value of the actual load corresponding to 1 lb. per sq. in. indicated on the gage, the actual load in some instances being probably 5% less than that computed from the gage reading, in the case of the lighter loads, and, say, 3% less in the case of the heavier loads.

We come now to consider the results of the breaking tests of the cast-iron columns. Ten columns were tested, six of them (Fig. 3) being 15 ft. 10¼ ins. long, 15 ins. diameter, and from 1 to 1 3-16 in. thick; two (Fig. 4) were 13 ft. 4 ins. long, 8 ins. diam., and two were 10 ft. long and 6 ins. diameter. A condensed table of results, Table III, is given herewith, the last two columns of which are from our own calculations and are not given in the Building Department report, which gives only the actual data obtained without drawing any conclusions.

From the observations reported by Mr. Ewing we quote as follows:

Column 1.—Column suddenly broke under a total load of 1,356,000 lbs. into 10 pieces; the fractured surface began about 3 ft. 4 ins. (average) from the bottom.

FIG. 7.—COLUMN NO. 7. SHOWING BREAK AT ENDS AND MIDDLE OF 6-IN. COLUMN.

The quality of metal was medium grain; foundry dirt and blowholes were quite numerous; in one place the foundry dirt extended half way through the metal; in another place there was a thin layer of foundry dirt and honeycomb midway between the inner and outer surfaces; between this layer and the two surfaces, the metal was perfectly sound; this layer of foundry dirt contributed to the weakness of the column as was evident from an inspection of the fractured surface.

The column sheared at an angle of about 30° with an element of the surface, and about 45° with a normal to the surface, inside of the layer of foundry dirt, above referred to only. This layer of foundry dirt extended about 6 ins. around (circumference) on column. At another fractured surface where no defects occurred, the metal sheared along a spiral course about 45° with an element of the surface, and at an angle of 45° with a normal to the surface; this surface was about 15 ins. long.

Column II.—The column crushed near the lower end, many of the pieces being quite small; the bottom flange was left intact, the fractured surface beginning at the top of the flange or 1¾ ins. from the faced end of the column and extending around the shaft in an irregular manner reaching 5 ins. away from bottom flange in one place.

The shaft of the column above the fractured portion was found to be permanently sprung ½ in. in a distance of 9 ft. 4 ins. along shaft. The quality of metal at bottom of column, where fracture occurred, was medium grain and quite uniform in grain. Considerable quantities of foundry dirt was found at fractured surfaces and where the column crushed into small pieces, the foundry dirt extended all the way through in many spots.

The shaft sheared in several places at an angle of about 45° to the elements of the surface of the column parallel with its axis, the fractured surface following a sort of spiral path around the shaft. The metal at the same time sheared through at an angle of from 30° to 45° with a normal to the surface of column.

Column B 2.—The fractured portion of column was below the center, beginning 3 ft. 9 ins. from bottom and 6 ft. 6 in. from top of column.

FIG. 6.—COLUMN NO. 5. SHOWING BREAK AT BOTTOM AND PERMANENT SET IN UNBROKEN POSITION.

Quality of metal, rather coarse, but quite uniform. Flaws occurred in spots, but not bad. There was evidence of shear at 45°, the same as in preceding columns.

Column B 4 (Fig 5).—The quality of metal was rather coarse in center of shell, and somewhat finer toward the surfaces. Cinders and slag in considerable quantity, two bad spots nearly opposite at bottom of column where metal was poor; one of these was 5 ins. long on outside (around column) and extending about half way through the metal. On the opposite side the defective portion was 4 ins. wide on inside, and extended for one-third to two-thirds the way through the metal. There were indications of shear at about 45°, similar to cases previously noted, at the bottom, where the column broke into small pieces.

The total number of pieces was 15.

The fractured surfaces revealed many cinder pockets and blowholes near middle of column. Small cracks were observed in the necking near top of column.

Column 5 (Fig. 6).—Column broke into 14 pieces; all fractures occurred below the lower necking on column and broke through the bottom flange. The permanent set in the shaft between the upper and lower necking was 2 5-16 ins. in 8 ft. 3 ins.; the upper part of the shaft above the necking remained perfectly straight after the test. Flaws were found in fractured surfaces near bottom, of foundry dirt. One bad flaw about 5 ins. wide and 4 ins. high (long) on outside extending three-fifths of the way through.

Quality of metal was rather fine grain and very uniform where no flaws occurred. Part of the shaft remained intact to end, and part of flange was left on. After the test, it was found that a dummy head against which the end of the column bore, was broken in such a way that the load on the column was eccentric after the head gave out; the nature of the fracture sustains this belief.

Column 6.—The test was discontinued when a load of 2,033,000 lbs. had been reached, the capacity of the machine having been reached. The permanent set of the column after it was removed from the testing machine was 13-16 in. in a length of 8 ft. 5 ins. The concave side, after the test, was about 90° from the joints of the flask, and undoubtedly was the top of the column as cast in the mold.

Column XVI.—One fracture occurred at a point where the chaplet for holding down the core was imbedded into the metal of the column. The metal outside of the chaplet was ⅞ in. thick, and the chaplet 3-16 in. metal. The cast metal did not adhere to the chaplet.

The column broke into 6 pieces (at middle and at each end). The fracture at the middle was nearly square off, and very near the exact middle point between the two ends. The fractures were about one foot from each end and irregular in outline.

The metal was good, of medium grain. Wires were attached to the shaft of the column, 6 ft. 6 ins. from bottom, and ran perpendicular to the axis of the column, one horizontally and one vertically. These were carried to the outside of the building in which the tests were being made, and the actual vertical and horizontal deflections of the column were observed in conjunction with the corresponding loads.

There was no evidence of shear at the fractured surfaces, as in the case of the larger columns. Failure seemed to result primarily from flexure.

Column XVII.—The column broke into 8 pieces, the fractured points being at the middle and near each end.

Quality of metal at fractured surfaces was fine grain, uniform and free from flaws.

Column 7 (Fig. 7) was broken into four pieces, the fractures being 3 ins. to one side of the middle of the column and near each end. The quality of the metal was good, even medium grain, with no flaws.

Column 8.—The quality of metal was fine grain, uniform and free from flaws. The column broke into four pieces, fractures being at middle and near ends; broke off nearly square at each point; no signs of shear in metal.

Two of the 15 in. columns tested, Nos. B 2 and B 4, were taken from the Ireland building, which, it will be remembered, collapsed Aug. 8, 1895 (Eng. News News Aug. 15, 22, 29, Sept. 5, Oct. 3, 1895). The four remaining 15 in. columns were made from drawings prepared by the Department of Buildings of New York city (Fig. 3), and were as nearly as possible duplicates of the Ireland columns.

The columns marked I and II were made by the Jackson Iron Works, 27th St. and East River, New York city, of their ordinary run of metal. They were cast while other columns were being cast, with no knowledge of their ultimate use. The two marked 5 and 6 were made by the Healy Iron Works, Brooklyn, N. Y., who were informed of what the columns were wanted for. The drawings for the 6 in. and 8 in. columns (Fig. 4) were also made by the Department.

All the columns broken were, we understand, fair samples of the average cast-iron column used in buildings in New York city, and regularly passed by the Building Department as coming within the provisions of the law.

The Building Law of the city of New York says:

The strength of all columns and posts shall be computed according to Gordon's formulæ, and the crushing weights in pounds, to the square inch in section, for the following materials, shall be taken as the coefficient in said formulæ, namely: Cast iron, 80,000. . . . The factors of safety shall be as one to four for all posts, columns and other vertical supports when of wrought iron or rolled steel, and as one to five for other materials, subject to a compressive strain.

Applying Gordon's formula* with the coefficient 80,000, as above required, in the numerator, and 400 (which is not given in the law, but is given in Haswell's Pocket Book, to which reference is made) in the denominator, we have

$$S = A\frac{80,000}{1+\frac{l^2}{400\,d^2}}$$

in which S is the breaking load, A = sectional area in sq. ins., l = length and d = diameter of the column in inches.

For the 15 in. columns we have l = 190 ins., d = 15 ins., S = 57,143 A. For the 8 in. columns l = 160 ins., d = 8 ins., S = 40,000 A. For the 6 in. columns, l = 120 ins., d = 6 ins., S = 40,000 A. That is, by the New York law, the 15 in. columns would be calculated to have a breaking strength of 57,143 lbs. per sq. in., while the actual tests show that their strength was only from 24,900 lbs. to something over 40,400 lbs. per sq. in. The 6 and 8 in. columns would be calculated to have a breaking strength of 40,000 lbs. per sq. in. while their actual breaking strength was only from 22,700 to 31,900 lbs. If such columns as these are loaded in buildings with the loads which the law allows, the factor of safety, instead of being 5, as required in the law, is actually in some cases little more than 2. This is also borne out by the results obtained during similar tests conducted about a year ago by the Department of Buildings with full sized cast iron columns. The dimensions and results of these tests are given in Table IV. The values given in the column headed "breaking load" are in round numbers, hence the breaking loads per sq. in. of area are correct to the hundreds as given.

* Mechanics' and Engineers' Pocket Book, Chas. H. Haswell, 1897, p 768.

Following his usual practice, Mr. Alex. Bremner, of Montreal, has issued a useful calendar for the current year.

Attention is called in the advertisement in this number of the James Smart Manufacturing Co., of Brockville, to the merits of the Kelsey corrugated warm air generator. This heat generator is said to be in satisfactory operation in every province of the Dominion.

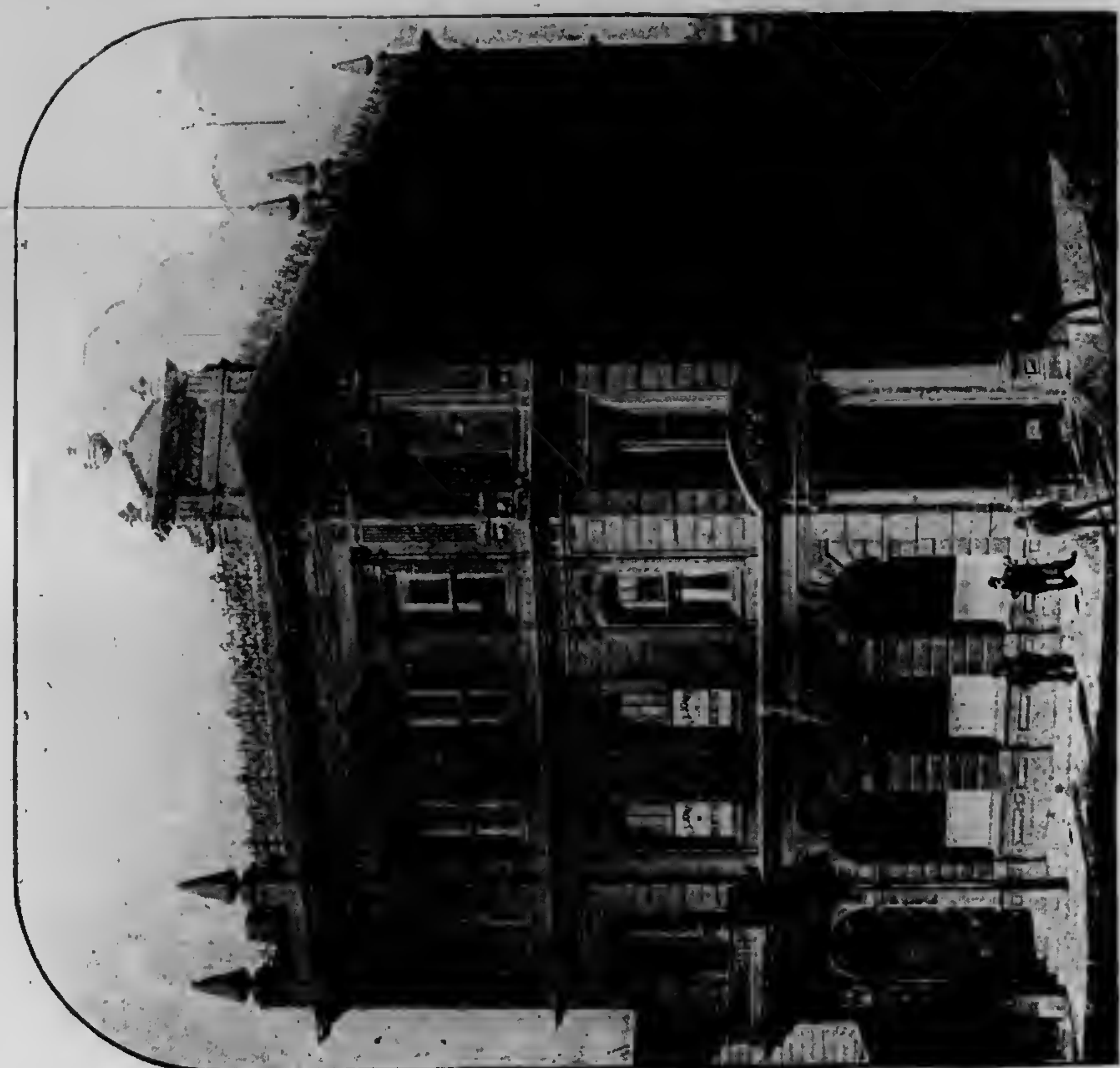
A very neat catalogue has just been issued by the Luxfer Prism Co., of Toronto, explanatory of their prismatic glass and the methods of using it. It contains views of many prominent buildings throughout Canada in which prismatic glass is employed, and many excellent testimonials from the owners as to its value as a light diffusing agent. The fact has recently been discovered that prismatic glass possesses the additional and valuable quality of resisting the action of fire. Satisfactory evidence of this fact was given at a test conducted at Chicago recently in the presence of the Chief of the Fire Brigade and Underwriters of that city. After being heated to a very high temperature the glass was sprayed with cold water. The result was found to be that while the glass was cracked in all directions, it could not be dislodged from the metal framework. The company purpose making a similar test in Toronto at an early date.

COOLING ROOMS IN SUMMER.

An apparatus has been devised by Professor Elmer Gates of Washington for the ready cooling of rooms in summer, which he declares to be capable of being more cheaply operated in summer than a coal stove in winter. It is simply a tall cylinder of galvanized iron resting in a large basin or pan, and connecting at the top with the ordinary stovepipe, or with a tube leading out of the window. In the top of the cylinder's interior is a perforated tubular ring, and when a cock is turned on this ring an artificial shower is caused inside the cylinder. The water thus flowing down the sides takes a rapid spiral motion, which sucks the air down the cylinder at a rapid rate, a fine spray inside cooling the air thus entering, reducing its humidity to normal and taking out all dust and bad odors; the water collects in the basin below, from which it is drained off, the cool air escaping through openings just above the water surface of the basin. In some experiments exhibited with this contrivance, the temperature of the air on entering the cooling cylinder was observed to be about ninety-two degrees, while it was as low as sixty-eight on its coming out at the bottom. When the temperature of the laboratory is ninety-two degrees, the atmosphere inside can thus be cooled to about seventy within three hours, and the humidity at the same time may go down to from one hundred to about normal.

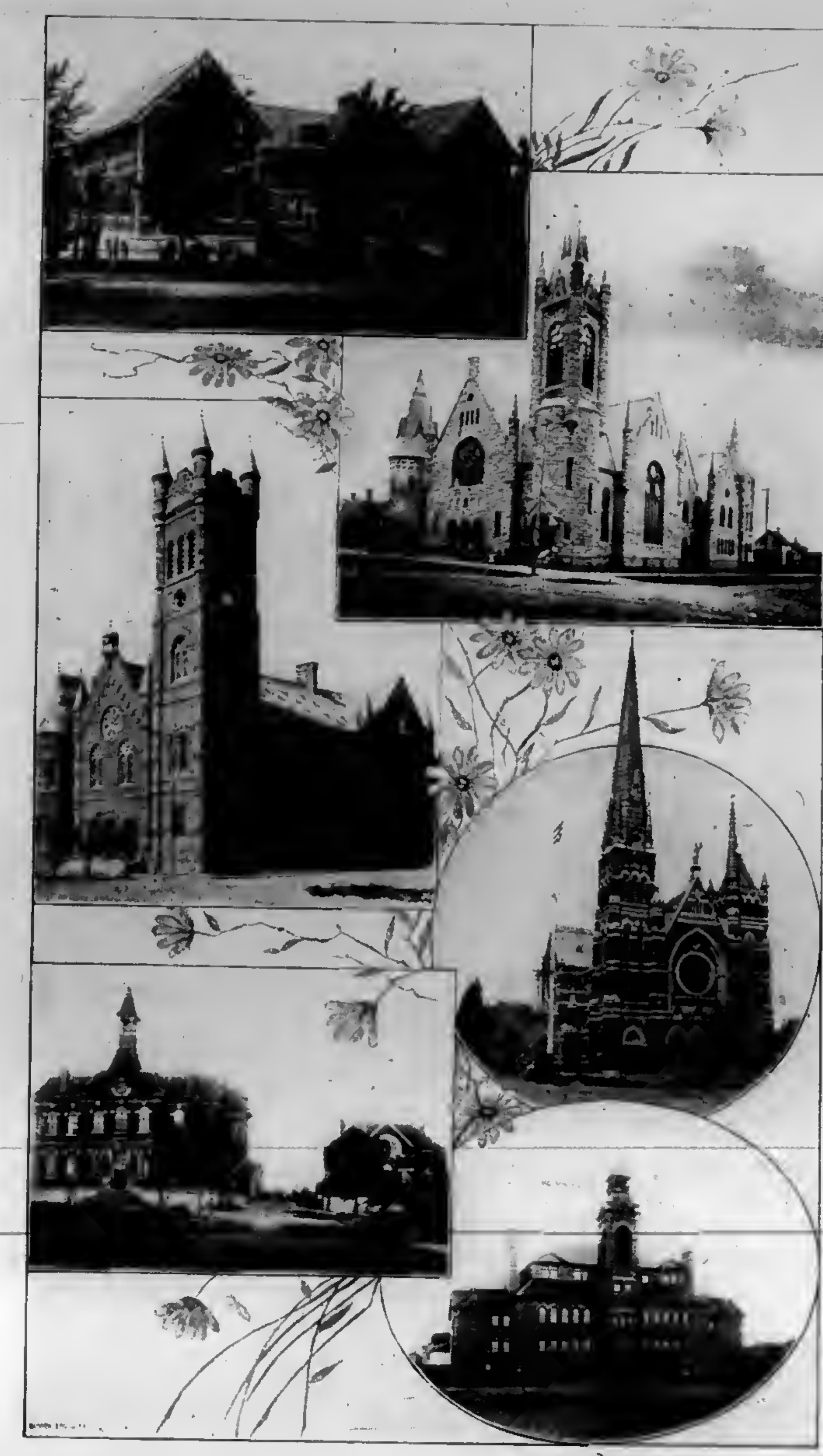
Mr. John H. Russell, architect, of Winnipeg, Man., was married on the 2nd inst., in Toronto, to Miss Aggie Campbell, daughter of Mr. Thos. Campbell, of that city.

DESIGN FOR PASSENGER STATION
[illegible] MACDONALD ARCHITECT.



BANK OF BRITISH COLUMBIA, VICTORIA, B.C.

BANK OF MONTREAL, VICTORIA, B.C.
F. M. RATTENBURG, ARCHITECT.



CHURCHES AND SCHOOLS, VICTORIA, B.C.

1. SOUTH WARD PRIMARY SCHOOL.—W. Ridgeway Wilson, Architect.
2. PANDORA STREET METHODIST CHURCH.—Thomas Hooper, Architect.
3. ST. ANDREW'S PRESBYTERIAN CHURCH.—The late L. Buttress Trimen, Architect.
4. R. C. CATHEDRAL (from plans of R. C. Cathedral, Longueuil, Que.)
5. CENTRAL AND HIGH SCHOOLS AND GYMNASIUM.—W. S. Gore, Architect.
6. NORTH WARD PRIMARY SCHOOL.—J. Soule, Architect.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CANADIAN ARCHITECT AND BUILDER.

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—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTRREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and cahnges of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery.

Compulsory Ventilation, Etc.

A BILL has recently passed the New York Senate which provides that every school house or other public building hereafter erected in cities or towns of more than 5,000 inhabitants shall be provided with proper means of ventilation. It is provided also that prior to the erection or alteration of any school building a detailed statement in writing of the specifications and a copy of the plans shall be submitted to the local school board, accompanied by a sworn statement regarding the provisions made for sanitation, ventilation and fire protection. The word school house is defined to mean any building in which public or private instruction is given to ten pupils at one time.

Proposed Greater Britain Exhibition.

ARRANGEMENTS are well under way for the holding of what is termed a Greater Britain Exhibition at Earl's Court, London, next year, lasting from May until October. The undertaking, which is under the direct management of the London Exhibitions, Limited, a company formed in 1894, and having a paid-up capital of £145,000, is receiving the approval and support of the Marquis of Lorne, Sir Charles Tupper, and other distinguished British and Colonial statesmen. The object, which is to bring together the products of the various parts of the British Empire, should commend itself to all who wish for a closer commercial relationship between Great Britain and her colonies. The Canadian government will be asked to grant an appropriation to cover the cost of a Canadian exhibit. Attention is called to the fact that exhibits intended for the Paris Exhibition of 1900 might with advantage and little additional cost be first shown at the London Exhibition. In view of the prevailing sentiment on both sides of the water in favor of closer trade relations, Canada should take advantage of every opportunity to make known her resources.

The Proposed Victoria Square.

AFTER having given careful investigation to the subject, Sir Oliver Mowat has declared that there is no ground for the contention that the city of Toronto is the owner of the square on King street west formerly occupied by Upper Canada College. In view of this decision, the correctness of which is not likely to be called in question,

the City Council should give immediate attention to the project for establishing a public square at the south-east corner of Queen and Bay streets, opposite the new Municipal Buildings. A square in the heart of the business district is a conspicuous and attractive feature of most cities, and is no less a necessity in Toronto than in Montreal, Hamilton and Detroit. What would New York be without the series of squares adjoining Broadway at intervals between 14th street and Central Park? They are a source of untold pleasure and comfort to the citizens and to visitors. The present opportunity to secure at an extremely reasonable cost for the purpose of a central square what is beyond question the most desirable site in the city should not be allowed to pass. We hope the Council will take immediate and definite action to secure this much needed improvement.

Painters' Profits. THE complaint is heard that the competition of unskilled labor and department stores is ruining the business of painters and paper hangers. It is said that many men deprived by female labor of their occupation as clerks, office assistants, etc., have turned their attention to paper hanging as better suited to their tastes and acquirements than outdoor employment. The result is that prices for paper hanging have been reduced from 15 cents to 8 cents per roll. It is difficult to understand how work can be done by skilled labor at less than 12 cents per roll, and events will prove that those who give the preference to unskilled workmen because they offer their services cheaply, will in the end find that they have made a poor bargain. Painters who desire to be free from this unfair competition should seek to attain to a higher standard of artistic knowledge and skill, thereby placing themselves in a position to cater for a better class of work, such as no amateur would be allowed to undertake. The painter and decorator who follows this course will find that as he ascends the ladder of knowledge and ability his competitors will grow fewer in number in other words that there is room at the top.

Building Conditions. THE columns of our weekly edition, the CONTRACT RECORD, afford evidence that the building industry is feeling the pulsations of steadily increasing activity at present distinguishing every branch of commercial enterprise in Canada. Building projects large and small are numerous in all parts of the country, and the coming season promises to be marked by an unusually large expenditure on construction account. Even in Toronto, where, owing to overbuilding arising out of the real estate boom, stagnation has been the prevailing condition for five or six years past, considerable work is in prospect. In sympathy with this improved condition of affairs has come a rise in price of several classes of building materials, notably bricks and cement. Brick manufacturers in the neighborhood of Toronto have allowed their works to stand idle for two or three years past, owing to lack of demand and consequent low prices. With the renewed activity in building operations comes the announcement that stocks are at a low ebb, and in consequence prices have already advanced to a point where it is claimed undertakings are likely to be checked by reason of the substantial increase in cost. It is to be hoped that this point has not and may not be reached, as the city is greatly in need of the stimulus which a season of activity in building would impart. Prices of cement have advanced considerably, and the prophecy is made that they may be expected to rise still higher. The reason given for this opinion is that the Canadian government has already invited tenders for a quantity greatly exceeding the total production of the Canadian factories, while the British supply will be largely reduced by the requirements of Imperial government works. The fact that on the first of July the advantages accorded to Germany under the preferential tariff will come to an end, is likely to lessen the supply from that quarter, and help to stiffen prices.

Professional Ethics. THE communication which we publish in this number from a young architect in the Northwest, following several of similar character addressed to us recently, indicate that many of the younger members of the profession are at variance with the policy of the Ontario Association of Architects, as well as with the individual conduct of gentlemen who occupy a prominent place in the Association and the profession. These criticisms in some respects appear to be well founded, in others the position assumed by the authors seems not to be capable of being successful defence. Honest criticism, whether well founded or otherwise, is calculated to accomplish good rather than harm. "To see oorsels as ithers see us" tends to rid us of our faults and induce us to strive after improvement. The remarks of our correspondent in the present issue anent the wide gulph separating the preaching and practice of some prominent architects on the ethics which should govern the practice of the profession, especially in relation to architectural competitions, are timely and deserving of consideration. Until prominent members of the profession hold aloof from improperly conducted competitions and in other respects conform to the principles which should govern honorable practice, it is quite useless to lecture the younger men on architectural ethics or expect them to uphold the dignity of the profession. There can be no improvement in this regard until those who are regarded as representative architects are willing to forego the chance of securing temporary financial benefit at the expense of the status of the profession. So long as greed of the almighty dollar continues to be the chief impelling motive, the status of the profession may be expected to sink lower and lower until it shall become entirely lost to public esteem. There must be a closer agreement between preaching and practice on the part of those who claim to constitute the respectable element if the profession is to regain the ground already lost and attain to a higher standard. If legislation could be secured similar to that which now obtains in Quebec, we might reasonably hope to see the standard of architectural practice in Ontario at least raised to a higher plane than at present. To secure this legislation seems to be the most important object to which the efforts of the Ontario Association of Architects can be directed.

The Safety of Building. WE commend the action of the property committee of the Kingston City Council in securing the advice of Mr. Power as to the safety of the public buildings of that city. With the recent disasters at London and Oshawa (which might have been avoided had those in charge of the public buildings in these towns acted in a similar manner) fresh in mind it behooves all who have the public safety in their keeping to look well into such

matters, and the committee in question in engaging the leading architect of the city has perhaps taken the best course open to it But what is reported to have taken place at a subsequent meeting of the Council emphasizes the folly of leaving the care of the public safety in matters of this sort to such bodies as city and town Councils, composed of men who, like Alderman Donnelly, (who claims to a "knowledge of the strength of timbers") think that any builder who has had a more or less varied experience in the erection of buildings, is a competent authority upon all matters connected with their safety. To arrive at a sound decision as to the safety of a public building requires an advanced scientific and mathematical education and a knowledge which can only be obtained by a comprehensive course of reading in purely technical and architectural subjects for it is not only necessary to calculate strength and possible strains and loads upon walls, piers, beams, &c., but also to consider the effect of age and dilapidations, &c., upon the various materials of construction the arrangement, plan, &c., and provision for egress in the event of sudden panic, the possibility of escape being cut off in the event of fire, and many other matters which would never enter the head of an ordinary layman. This knowledge is not possessed by every builder, or even by every person who calls himself an architect—and an inspection and report upon an unsafe building by an incompetent person is a distinct aggravation of the danger, as it tends to produce a fancied security which does not exist. What is needed is that all buildings in which the public assemble in numbers should be periodically inspected and reported upon by a qualified architect, and his report published, so that the public may know what buildings are safe and what are not. That the present system or want of system in looking after such buildings does not safeguard the public interest is plain from the fact that failures like those at London and Oshawa are continually occurring. This is due partly to the fact that those in charge of such buildings are not required by law to publish any statement of the condition they are in and that there is no legal standard whereby the competent architect can be distinguished from the incompetent—the first relieving those who are inclined to neglect their duty and the second tending to void the efforts of those who wish to do it and have the building in their charge kept in a safe condition. If the Ontario legislature will follow the example of Quebec and amend the "Architects' Act" so as to give the public an opportunity of distinguishing between competent and incompetent practitioners in architecture, a long step in advance will be made.

Mr. Chas. Dawson, formerly superintendent for the Central Bridge and Engineering Co., of Peterboro, has accepted the position of assistant superintendent for the Dominion Bridge Co., Montreal.

The second quarterly part of the Journal of the Royal Institute of British Architects, received at the library of the Ontario Association of Architects, is more than usually good, containing, among other matter, a review of "Modern Architecture" the last work of Mr. T. Heathcote Stratham, the editor of The Builder. A copy of this admirable book is in the Toronto public library. There is also an important and copiously illustrated paper by Mr. Edwin Sachs, on "The Housing of the Drama"; an illustrated historical paper on the "Mediaeval Campanile of Rome," by Mr. I. Tavenor Perry; a paper by Mr. G. D. Crace on "Heraldic Drawing and its Adaptation," and also a review by Mr. Gotch, whose name is also associated with this subject, of a recently published handbook of Decorative Heraldry by G. W. Eve.

BY THE WAY.

THE excellent specimens of terra cotta work from the Rathbun Works at Deseronto, which adorn the facade of the new building at the corner of King and Yonge streets, Toronto, serve to illustrate the progress which has taken place in this branch of manufacture in Canada in recent years. The material is now made in any desired shade, and the specimens referred to are as clean cut as though chiselled in stone.

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M. GIOT, of Ivry, who is a contractor for painting, has won the great prize in the lottery of the Paris Exhibition of 1900. It amounts to £20,000. An English contemporary naievly remarks that M. Giot, who is a Socialist, may be expected by his fellow-believers to divide with them the proceeds of his lucky venture, but, like the late William Morris, although he may talk by the hour about the necessity of collectivism, will think it his duty to acquire all he can for the mere enjoyment of wealth.

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THE City Council is being urged to add this that and the other expense to the cost of construction and equipment of the new municipal buildings at Toronto. The specious argument is employed that inasmuch as the original estimate of cost has already been so largely exceeded, the expenditure of a few more thousands would be a matter of no consequence, while it would be so nice, you know, to have a chime of bells and all the latest attractions. I infer that the people who talk in this strain are more likely to have stock in a bell foundry than a large interest in keeping the city taxes at a point which will induce people to regard the city as a desirable place in which to live and make investments. The new municipal buildings should be completed as speedily as possible and without a single dollar of extra expenditure that can be avoided.

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A WELL known architect with whom I chatted the other day remarked on the public disposition to regard the member of the profession who is known to possess the artistic quality as being necessarily unpractical, and lacking in a knowledge of materials and methods of construction. For example, having consented at his client's request to ask the opinion of a brother architect on a certain point connected with the erection of an important public puilding, the gentleman of his choice was objected to on the ground that his artistic proclivities made it improbable that his opinion on a constructional point would have much value. "As a matter of fact," said my friend, "I know of no architect in Canada, or in America, who has a better knowledge of planning and construction." In this, as in other particulars, a man is apt to be judged by the company he keeps. The architect whose inclinations run in the line of the artistic will be likely to choose the association of artists and such like kindred spirits, and will be in danger of being regarded by the commercial world as an idealist, while the man who graduates from the ranks of the real estate or building speculator, will probably be credited with having a thorough knowledge of the practical side of the profession.

The firm of Curry, Baker & Co., architects, Toronto, has been dissolved. Mr. Curry retains the offices formerly occupied by the firm, while Mr. Baker has rented new offices in the same building.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Among the few architects who contributed drawings to the recent R. C. A. exhibition at Toronto were Messrs. A. T. Taylor, F.R.I.B.A., and Prof. S. H. Capper, A.R.C.A., of this city. The former exhibited a pen and ink perspective of the Jubilee Nurses Home, Montreal General Hospital, and the latter four drawings, viz., a new Orphanage for Girls, Whitinch, Glasgow, with separate drawing of doorway; Club House, Barnton; St. Mark's Venice.

For some time past the financial difficulties of McGill University have been the subject of public comment. The endowment funds of the university have not kept pace with the increased expenses due to the new buildings erected and departments established in recent years with funds generously donated for the purpose. As a consequence, salaries have had to be fixed so low that but for the privilege given the instructors of engaging in outside pursuits they would not be able to maintain their positions. Such a condition of affairs is incompatible with the best interests of the students and the university. It is therefore gratifying to learn that there is a probability of the endowment funds being placed at an early date on a satisfactory footing through the munificence of Mr. W. C. McDonald and Lord Strathcona, to whom the institution is already under heavy obligations. In this connection I am pleased to record the recent gift by Mr. McDonald of $15,500 as an endowment fund to the Department of Architecture for the purchase of supplies and materials.

MEETING OF WHOLESALERS.

The Plumbers' Wholesale Supply Association of Toronto will hold their annual meeting in Montreal at the rooms of the Montreal Builders' Exchange on the 15th and 16th of this month.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The last of the winter series of lectures under the auspices of the Province of Quebec Association of Architects was delivered by Prof. S. H. Capper, in the art gallery on March 29th. The subject of the lecture was "Ancient Rome." The lecture was illustrated by numerous lantern slides. The audience was large. Rev. J. Edgar Hall presided, and at the close moved a vote of thanks to Prof. Capper and the P. Q. A. A.

MONTREAL BUILDERS' EXCHANGE.

The membership of the Builders' Exchange is still increasing rapidly. The Exchange will shortly inaugurate a series of instructive lectures on different subjects relating to the building trades. Arrangements for these lectures which are to be given by the members once a month, are well under way. Messrs. Simpson, president, and Sheppard, secretary, have been requested to learn what dates would be most convenient. The secretary advises me that Mr. J. W. Hughes, the well known plumber, of this city, will give the first lecture of the series, his subject being "The Value of Organization." Every member should take advantage of the opportunity to hear these lectures, the inauguration of which is highly creditable to the management of the Exchange. Further particulars will be given from time to time in these columns.

MONTREAL ART ASSOCIATION.

The Spring Exhibition of the above Association is now being held in the art gallery, and is attracting considerable attention. There is a better display of architectural drawings than usual, although there is still room for a vast improvement in this particular. The architectural exhibit includes color drawings by Mr. Edward Maxwell of new C. P. R. depots at Vancouver, B. C., Moosejaw, N. W. T., and McAdam Junction, N. B. Messrs. Cox & Amos show drawings of the new tower and spire of St. Luke's church at Waterloo, Que., the new Montreal Hunt Club house and the Church of the Advent at Westmount. Messrs. Saxe & Archibald exhibit drawings of residences on Grosvener avenue, Westmount, and Mr. Arnold Findlay has some foreign sketches. In view of the fact that the annual meeting of the P. Q. A. A. will this year be held in Montreal, it is hoped that another architectural exhibition similar to that of 1896 may be undertaken.

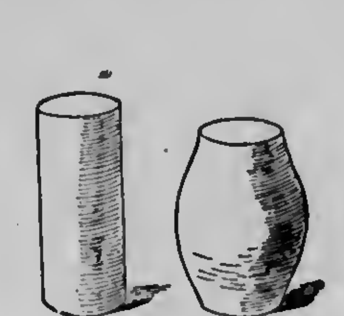
MOULDING MARBLE.

BRIEF mention was recently made in the CANADIAN ARCHITECT AND BUILDER of experiments conducted at McGill University by Professors Adams and Nicholson, which had resulted in the discovery that by means of pressure alone marble can be moulded into almost any desired form while retaining its strength. Further details of this wonderful discovery will no doubt be received with interest by your readers.

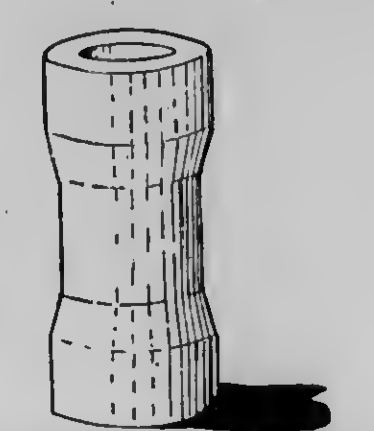
As before stated, the discovery at McGill shows that, however brittle a rock may seem to be, it is in reality a plastic substance, capable of flowing into new shapes as surely, if not as readily, as putty or dough is moulded.

The experiments so far conducted have been made chiefly with pure Carrara marble, and the process followed is thus described in detail by Prof. Adams: Columns of marble two centimeters and two and one-half in diameter and about four centimeters in length, are very accurately turned and polished. Heavy wrought iron tubes are then made, imitating the plan adopted in the construction of ordance, by rolling long strips of Swedish iron and welding the strips to the bar as they are rolled around it. When the welding process is completed, the core of soft iron, around which the Swedish iron has been wound, is drilled out, leaving a tube of welded Swedish iron six millimeters thick, and so constructed that the fibres of the iron run round the tube instead of being parallel to its length. The tube is then very accurately fitted on to a column of marble. This is accomplished by giving a very slight taper to both the column and the interior of the tube, and so arranging it that the marble will pass only half way into the tube when cold.

The tube is then expanded by heating so as to allow the marble to pass completely into it, and at the same time leave about three centimeters of the tube free at either end. On allowing the tube to cool, a perfect contact between the iron and the marble is obtained, and it is no longer possible to withdraw the latter. Any very slight failure to fit at any point, if such a failure exists in any case, is rendered harmless by the fact that under a compara-



MARBLE COLUMN BEFORE AND AFTER PRESSURE.



IRON COLUMN INCLOSING THE MARBLE READY FOR SQUEEZING.

tively low pressure, the limestone is found to be sufficiently elastic not only to fill up any such minute space, but even to stretch the tube, and, on the pressure being relieved, to contract again to its original form, so that it will drop out of the tube which has been thus enlarged.

When the marble has been firmly placed in position in the tube, an accurately fitting sliding steel plug is inserted in either end, and by means of these the marble is submitted to a pressure far above that which would be sufficient to crush it if not so enclosed. The machine employed in obtaining the pressure is so arranged that it (the pressure) might be maintained for weeks, or even months, if required. Under these circumstances the conditions of pressure to which the marble is subjected are those to be found in the "zone of flow" of the earth's crust.

Under the pressure which is applied gradually, and in some cases continued for several weeks, the tube is found to slowly bulge until a very marked enlargement of the portion surrounding the marble takes place. The tube is then cut longitudinally, by means of a milling machine, along two lines opposite to one another.

When thus cut the marble within is found to be firm, so much so in fact that it holds the respective sides of the iron tube, separated as they are, so tightly together that it is impossible without mechanical aids to tear them apart. By the means of a wedge they can be separated, but the force of the blow frequently has the effect of splitting the marble through longitudinally.

In one experiment conducted by Professors Adams and Nicholson, the column of marble was reduced from 40 to 21 millimetres in height.

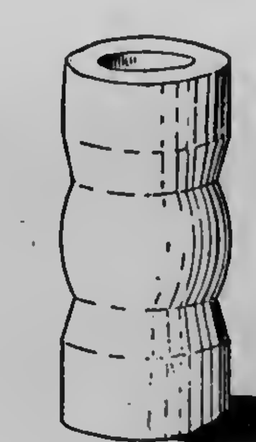
The deformed marble differs somewhat from the original rock in having a dead white color, the glistening cleavage faces of calcite being no longer visible. Although not so hard as the original rock, it is still firm and compact, especially so when its deformation has been carried out very slowly. No accurate measurements as to its strength have yet been made, but it will withstand a very sharp blow, and fragments of it weighing ten grams have been allowed to fall from a height of over eight feet onto a wooden platform from which they have rebounded without breaking. Thin sections of the deformed marble, when examined under the microscope, show that the calcite individuals composing the rock have, in many cases, been twisted and flattened, and in the majority of cases, a very fine polysynthetic pressure-twinning has been produced in them, with movement along gliding planes, as well as several other structures seen in nature in highly deformed rocks.

The experiments show that limestone and marble, even when dry and at ordinary temperatures, possess a certain degree of

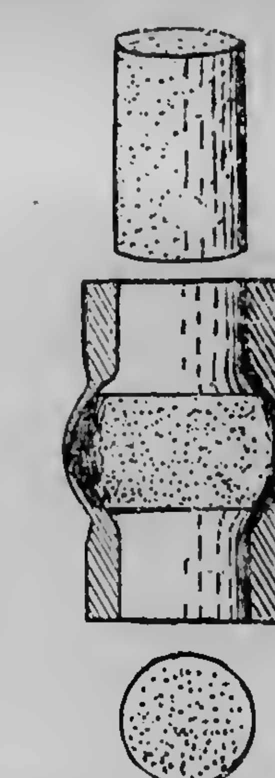
plasticity, and can be made to flow, the movements set up developing many structures characteristic of rocks which have been squeezed or folded in the deeper portions of the earth's crust.

It is now the intention of Professors Adams and Nicholson to reproduce more accurately, if possible, the deformation and cataclastic structures of the interior of the earth. For this purpose they have invented an apparatus capable of generating great heat. With this they propose to surround the iron tube, and, by means of steam and heat, obtain those conditions which surround the plastic marble in the bowels of the earth. It has been shown by geologists that marble and other stone formations become plastic in proportion to the depth they are found in mother earth. Thus, marble found five hundred feet below the surface of the ground is much less brittle than that found, say, at a depth of one hundred feet. The reason for these different degrees of plasticity consists in the fact that the former is subjected to far greater heat and moisture than the latter. By means of their new contrivance Professors Adams and Nicholson are confident that they can reproduce the conditions that prevail far beneath the surface of the earth, and they are awaiting with confidence the results of their future experiments.

The machinery used in all these experiments was designed and



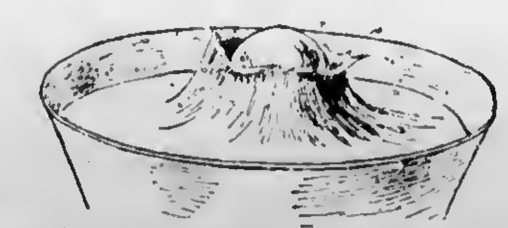
THE CYLINDER AFTER FIRST APPLICATION OF PRESSURE.



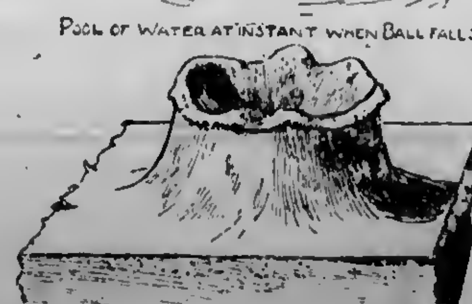
COLUMN BEFORE PRESSURE—CYLINDER IN WHICH COLUMN HAS BEEN REDUCED BY PRESSURE AND HAS BURST IRON SHEETING.

manufactured at McGill, and its counterpart does not exist elsewhere on this continent. It is largely the work of the students, who are thus trained in the principles underlying mechanics and hydraulics. The average pressure employed in moulding the marble is 80,000 pounds to the square inch. This is obtained by a number of hydraulic cylinders, which increases the natural pressure of the water mains—130 pounds to the square inch—to the above astounding proportions.

The opinion has been expressed that the experiments suggest a danger from the building of such sky-scrapers as are springing up in our cities. It has been said that if marble, one of the hardest of stones, yields to and becomes plastic under sufficient pressure, then clearly there must be a limit to the height to which one building stone can be heaped upon another in the erection of walls, without incurring the danger of such yielding of the stones of the bottom of the wall or building as will endanger the integrity of a building. For, short of the point at which the stone crumbles, there is apparently a point at which it may slowly



POOL OF WATER AT INSTANT WHEN BALL FALLS INTO IT.



ARMOR PLATE PENETRATED BY CANNON BALL

change its shape under stress of heavy and long continued pressure.

In reference to this surmise Prof. Nicholson says: "The height of a uniformly thick brick wall required to crush brickwork is about one thousand feet, and that of a stone wall to crush either sandstone or limestone about five thousand feet. Long before these heights could be reached the building would have failed from lack of lateral stability under wind pressure, unless the width of base was of similar proportion to the height. Chimneys from five hundred to six hundred feet in height have, it is true, been built, and are still standing, but they have, of course, a regular batter all the way up, reducing the load very much. The crushing pressures assumed by me in my computations on this subject are 800 lbs. per square inch for brick work and 4,400 pounds per square inch for sandstone. There is not, therefore, nor can there be any sky-scraper a near approach to the moulding pressures, such as 70,000 to 80,000 pounds per square inch, employed in our experiments at McGill."

The experiments regarding the mobility of marble put quite a new complexion upon the question of glacial movement. For if it be proved that marble, a substance far harder than ice, and quite as brittle, can be molded by pressure alone into new shapes, it seems perfectly plausible that a much less degree of pressure might mold ice into new forms by causing its molecules to slide over one another without the intervention of melting. In this view ice and marble, and, of course, all other solids, are to be regarded as merely very stiff or viscid liquids. Gravitation alone does not suffice to make them flow, as it does more limpid liquids, but when additional force is applied their mobility becomes apparent.

This view, indeed, as applied to such solids as iron and other malleable metals is not new, for the mobility of such solids under pressure, as when hammered, is widely known. A curious experiment recently made by Professor Sinclair has illustrated this in a very vivid way. By means of an ingenious apparatus it has been possible to photograph the surface of a bowl of water at the moment a ball dropped from a height falls into it. The photograph being instantaneous, the water splashed up about the ball gives the impression of a solid crater. But the curious feature is, that exactly such crater as this is formed into a sheet of armor plate. About the mouth of the hole where the ball enters the iron is a bulging rim or crater of iron, which was manifestly splashed up exactly as the water splashes up about the miniature ball, making the observer feel that the iron and the water are really of one physical nature, one being merely a little harder than the other. The experiments at McGill make it clear that the same thing is true of marble also; that, in short, in a broader view, brittle solids are only very fragile liquids, just as malleable solids are very tenacious liquids.

THE ST. THOMAS CITY HALL COMPETITION.

As soon as possible after the announcement of the above competition the Council of the Ontario Association of Architects sent a communication to the committee intimating that the terms of the competition were not such as would be likely to secure designs from the best men in the profession.

A copy of the code approved by the Association was also sent in order to inform the committee as to the points wherein their conditions were lacking. The committee declined to alter the terms. The members of the Association were informed of the action of the council and later of the decision of the committee.

We must congratulate the Council for its promptness in this case, and it is a matter of regret that its efforts were unsuccessful.

It is to be hoped that the members of the Association will sustain the action of their representatives, and by the absence of designs prove to the committee their mistake in not issuing suitable terms.

The outcome of the late London competition is a proof of the unsatisfactory nature of such competitions when not safeguarded by proper conditions, and it is amazing how architects will, for the very hazy chance of a job, throw all caution and esprit de corps to the winds. So long as this is the case they will be the dupes and tools of committees, who, too often, have already selected their man. We regret to have to say that even men who claim high standing in the profession have erred in this respect—men who have accepted office and by that act are published as representative men. Such conduct is demoralizing and will tend to license on the part of others, especially the younger men and to the gradual lowering of professional standards.

A PROTEST.

TORONTO, April 15th, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

DEAR SIR,—I very heartily endorse the remarks contained in the letter of "A Young Architect," in the CONTRACT RECORD of the 16th ultimo.

It seems to me simply outrageous that, not merely plain everyday members of the Ontario Association of Architects, but members of the Council, should soil their professional skirts by countenancing such a competition as that for the London hospital—even though the rumor be true that a "pull" was the tempting bait which led them blindly on. I am of the opinion that to follow such standards, not to speak of pursuing architecture on a "comercial basis" is destined to work incalculable harm to the Association—and even to the men who follow such ideals. Why should the honorable men of the society passively submit to the ruination of the influence of their Association by the action of such men?

I think, Mr. Editor, it is quite time to bring this question to the front. Every member of the profession should follow the closing precept of Garbutt's Elements of Design: "SEEK NOT TO SEEM WHAT YOU WOULD BE, BUT BE WHAT YOU WOULD SEEM."

Yours very truly,

ANOTHER YOUNG ARCHITECT.

POMPEII—A CITY OF THE FIRST CENTURY.*

By Prof. Adams, McGill University.

(Conclusion.)

The House of the Faun is larger, occupying a whole insula or block, and although laid out in the same general plan, is more elaborate, and is always considered to be the principal house in Pompeii.

It has two atria; which is very unusual. The Tablinum, following the usual custom—but unlike that in the Tragic Poet's House—opens off the Atrium. The Peristyle is large and has a corresponding room opening off it—the Exhedra—used as a reception room—while behind the Peristyle, occupying the whole rear of the block, was a spacious garden also surrounded by a colonnade.

But what renders this house remarkable, even more than its size and beauty, is the richness of its decorations, but especially of its mosaics; of these may be especially mentioned the Nile Mosaic, which forms the threshold of the exhedra, and the Battle of Issus, which forms its pavement.

While the mosaics are numerous, the wall paintings are few in number. The house dates back to the time of the Republic in the 2nd century B.C., and impresses one with its air of elegant simplicity, being quite different in this respect to the more recent and much be-painted houses, which often, it must be confessed, have a tawdry appearance.

A few photographs will serve to give an idea of the house as it now stands.

Just inside the vestibule at threshold in mosaic is the word, "H.A.V.E." (Ave or Hail).

Vestibule rises by two steps and we enter the larger Atrium. On the little pedestal stood the wonderful bronze of the Dancing Faun, which gives its name to the house and which is now in the Museum at Naples.

When we walk into the Atrium we see the Impluvium and Tablinum, and further back the columns of the Peristyle.

Turning to the right and passing through a passage we enter the Peristyle. The roof of the covered walk around the columns has fallen in. The columns are all of brick and rubble work covered with a very fine stucco to imitate marble; this has in many places sealed off.

The wall at the back of the garden shows this well, for here the stucco is arranged to imitate panelling in marble, in buff colors. The stucco is still hard, smooth and polished. The little shrine, like that of the Tragic Poet's House, but simpler in design, is seen on the right.

The character of the wall beneath the stucco is seen at the other end of the garden, where the stucco has completely scaled off. Lumps of lava, held together by mortar, forms a coarse rubble work; forming the greater part of the wall. The arch over the doorway is made of travertine blocks, as is also the sides of the door, where, however, the travertine alternates with courses of flat Roman bricks.

The character of Roman brickwork is seen in this photograph of a brick wall; bricks longer and thinner than ours, like tiles mortar lasts longer than brick. Such bricks are usually considered to be characteristic of Roman work, but precisely similar bricks are now in use in Naples.

About 700 skeletons have been found in the city so far, which would show that 1,200 to 1,500 persons must have perished. In some instances, where the victims, instead of being smothered in ashes, were overwhelmed by a fine mud which was ejected during part of the eruption, Fiorelli hit upon a most ingenious method of restoration.

The objects over which this mud flowed were enveloped in it as in a plaster mould, and where these objects happened to be human bodies, their decay left a cavity in which their forms were as accurately preserved and rendered as in the mould prepared for the casting of a bronze statue. Such cavities had often been observed. In some of them remnants of charred wood accompanied with bronze or other ornaments showed that the object enclosed had been a piece of furniture, while in others the remnants of bones and of articles of apparel evinced but too plainly that the hollow had been the living grave which enclosed some unfortunate human being. In a happy moment the idea occurred to Signor Fiorelli of filling up the cavities with liquid plaster, and thus obtaining a cast of the objects which had been inclosed in them.

Almost immediately behind the House of the Faun, Sig. Fiorelli has just finished the excavation of a house which rivals, if it does not surpass, any in Pompeii.

The walls are covered with fine painted stucco and the Peristyle contains many marble and smaller bronze statues. A fountain played in the centre, and a little marble runnel about the edge of the Peristyle carried off the water. The lead pipes which supplied water to the fountain are still in perfect order.

On the door handle are inscribed the words "Casa Vettiorum."

This photograph of the Peristyle, taken during the progress of the excavations, shows it as it appeared when freed from the ashes. The boys, with their baskets and trucks for carrying off the excavated material, are seen in the background.

In this house nothing has been removed, and those parts which have been burned or broken have been carefully restored, the garden of the Peristyle has been planted with flowers, and we now have this Roman house of the first century precisely as it appeared the day before the city was destroyed.

This photograph shows one of the little shops (they were all small in Pompeii) which occupy the ground floor front of all the large Pompeiian houses, and to which attention has already been drawn. This particular shop forms part of the front of the House of Sallust, and was probably occupied by a dealer in oil or wine. A broad counter, formed of irregular slabs of marble set in mortar, runs around two sides of it, and in this one were large holes, beneath which large earthenware vessels were set containing the goods for sale. The next slide shows one of these shop fronts with the woodwork restored from existing evidence of many kinds. "The arrangement was very simple; part of the front was hinged so that it could be let down to form a projecting counter, and at night pulled up to form a closed shutter. Every Roman shop, whether in Italy or in distant colonies, seems to have been arranged in this way. Moreover, all Roman shops appear to have been quite small, exactly as is still the case in the East. A rich dealer may have a large warehouse, but his actual shop is no larger than those of his poorer fellow-tradesmen."

These shops had no windows and no light except what entered from the open front; they were, in fact, nothing more than large "holes in the wall," differing, however, in no respect from many of the small shops in the older parts of Naples and elsewhere in southern Italy at the present day.

This photograph shows the front of a large block of buildings facing the wharves in Naples. Shops of this kind are seen on either side of an archway leading to fine apartments about the inner court. This building is of course much higher than the Pompeian buildings, which were scarcely ever over two stories high. It will also serve to give some idea of the class of rookeries whose existence in Naples makes that city one of the most congested in Europe.

Several bakers' shops have been found in Pompeii, all in a tolerable state of preservation.

From various inscriptions in Pompeii, as well as from the examination of the shops, we know of the existence within the city of workmen of many other trades—dyers, goldsmiths, pastry cooks, fruitsellers, carpenters, carters, saltworkers, fishermen, muleteers, coachmen, potters, fullers, booksellers, etc., and much might be said about these, but time obliges us to pass on, in order that we may get a glimpse of another feature of this ancient world—Pompeiian art.

The most characteristic and remarkable remains of ancient art in Pompeii are its mosaics and its wall paintings. The bronzes, however, although in general not equal to those of Herculaneum, deserve a passing word of notice. "Some of the smaller bronzes especially are unsurpassed for character and vigor of execution, and have been reproduced in thousands, and are to be seen in all modern collections. Such particularly is the statuette of the Dancing Faun found in the House of the Faun, and from which the house derives its name. Nothing can exceed the vigor and animation with which the figure is executed. It is bearded and has the horns and tail of a goat. An oaken garland with acorns some of which seem to have fallen from their shells, encircles his head and proclaims his sylvan character. His attitude displays all the animated gestures of a drunken man; his widespread arms seem to accompany the movements of his feet, and he snaps his fingers for joy."

Another very graceful statue is the Narcissus, found in one of the smaller houses in Pompeii. His inclined head and earnest expression, as he listens for the voice of Echo, are admirably rendered, and it is considered one of the finest works yet discovered at Pompeii.

Perhaps the most celebrated bronze of all antiquity is the Mercury in Repose, discovered in Herculaneum. It is nearly life size. The messenger of the gods is seated and clearly reposing after rapid flight. The left foot and right hand both contribute toward bearing the weight of the body. The left holds a small piece of bronze rod, which perhaps originally formed part of the Caduceus—the only part of this beautiful figure which has been lost to us. The detail of the muscles and of the winged sandals is admirable, and every line of the composition is exquisite.

The mosaics of Pompeii, although in execution by no means equalling the best efforts of modern art, are remarkable for their excellence of design, and are so abundant that the dwellings of even this small and comparatively unimportant town have afforded many specimens good enough to be transferred to the palaces of Naples and ranked among their most precious ornaments. The Pompeiian mosaics are usually executed in black and white, but sometimes in colored marbles.

The walls of almost all the better class houses in Pompeii are elaborately painted. The colors employed are generally bright and seem to our taste rather gaudy. The deep red, known as Pompeiian red is very largely used. But in the half darkness of the houses when they were roofed in and provided with their curtains and hangings, the colors were probably sufficiently subdued.

The style of decoration adopted is remarkable and very striking. The wall surface is divided off into numerous compartments, usually set in an elaborate frame in imitation of architectural effects. Pilasters with architraves and cornices often festooned and elaborately decorated. Balconies, half open doors with figures advancing through them evidently suggested the scheme.

Within the framed compartments are represented urns, groups of statuary, etc., while the centre or chief compartment of each wall usually contains one of the pictures for which the city is so famous. This style of mural decoration is not peculiar to Pompeii, but is found in the other buried cities of the Campagna and also in Rome, in the few buildings of the same period which remain. It was derived from Alexandria where kings, great generals and statesmen loved to decorate their great halls of state with columns of priceless marbles, glorious statues and paintings by the great masters of the time. The ordinary citizen was obliged to content himself with a cheap reproduction of these glories; he had therefore false pilasters frescoed on his walls, framing false pictures and statues reproduced by the same process, and doubtless felt a pleasure like that of the kings and great lords when they walked in their

* Abstract of a lecture delivered before the resident members of the Province of Quebec Association of Architects at Montreal, January 20th, 1898. The lecture was illustrated by lantern slides.

palaces in the midst of their masterpieces. This economical process of fresco was invented in Egypt and we find certain of the latin writers expressing their contempt of the "Egyptian Invention" which they accuse of having ruined art, very much in the same terms as, those applied to photography by many people of our own day.

All these mural decorations and paintings are, when uncovered, as bright and fresh as when first painted but when exposed to the action of the air fade considerably and if allowed to remain in Pompeii exposed to the weather are gradually destroyed.

The wall pictures above referred to fall into two groups. The first, to which by far the larger number of pictures belong, consists chiefly of scenes from Grecian mythology. The second class consists of representations of the ordinary scenes of every day Pompeiian life—scenes from the street, the tavern and the amphitheatre.

The execution is in both classes rather inferior, often very poor, but in the pictures of the first class the composition, arrangement and grouping is usually excellent, and points to the conception and execution of the pictures as the work of two different men of very different ability. Furthermore the pictures of this class are often represented by a number of copies in the several cities of the Campagna, so that it seems certain from these and other considerations that in these paintings of the first class we have reproductions by the comparatively inferior artists of the time, of certain celebrated Grecian paintings of the Alexandria school, the originals of which have in all cases been lost, but references to which are to be found in the works of certain of the classical writers.

The pictures of the second class, on the other hand, are inferior in conception and arrangement and are represented by single examples. They follow no ancient model but were in conception and execution the works of the contemporary Pompeiian painters. They represent local scenes and personages.

Whatever may be their merits or demerits as works of art, these pictures are certainly of transcendent interest in that they have served to throw a flood of light upon the manners and customs of the Romans, and are our sole informants, with regard to ancient style, coloring and treatment of light and shade.

In one of the rooms of the "new house" which was being excavated at the time of my visit to Pompeii, and of which I threw a photograph on the screen showing the men at work, I photographed a panel on the wall, which had just, the day before, been freed from ashes after having been concealed for nearly 2,000 years. The colors were as bright as the day on which it was painted.

In concluding, I would like to show you, in rapid succession, a few slides of photographs of certain cases in the Naples museum, containing the collections of domestic implements and appliances found in Pompeii. The collection of small bronze articles numbers some 14,600 specimens, and is a unique feature of the Naples museum. The museum is a mine of wealth to the antiquarian, representing, as it does, almost our only source of acquaintance with ancient domestic life, and containing as it does specimens of all the every-day articles of personal use and ornament which eighteen centuries ago were connected with the public and private life of the Roman citizen.

The difference between these Pompeiian artificers and those of our utilitarian age is especially noticeable in these rooms. All these articles are designed and executed with a wonderful artistic grace. The master hand of the artist is displayed in a simple but unaffected manner, whereas our household chattels, being made to a pattern and in vast numbers, though they answer their purposes admirably, may justly be said to testify rather to the skill of the artizan than to the taste of the artist.

"By the help of the innumerable objects contained in this unique collection, we can follow out all the hours of a Roman day, in their several duties and amusements. We sit, or rather recline, with the wealthy nobleman at his meals, and criticize his table furniture, and almost pronounce upon the flavor of his dishes, or the age of his wine. We peep into the dressing room of his wife, and see her toilet apparatus, her rouge, her mirrors, her ornaments—in short, all the weapons with which she fought off the approaches of time. We penetrate into the kitchen, see the charcoal lighted in the brazier, hear the water bubbling in the urn; we sit with the student in the library, go out into the fields with the farmer, visit the shops of mechanics and artizans, and accompany the surgeon in his professional calls; we go with the respectable to the theatre, and with the wild young man to the gaming table, and see him lose his money to a Greek blackleg." And what strange inconsistencies we meet with in Pompeiian life: "There the wealthy citizen, leaving a house in which Grecian art had surrounded him with an atmosphere of ideal beauty, went to the amphitheatre, where he sat for hours witnessing the most cruel and brutalizing of sports, men hacking each other to pieces, or fighting with wild beasts, till the sand of the arena became soaked with blood. The tasteful amateur of art, when we look upon him from the side of humanity and philanthropy, is not much above a New Fiji Zealand cannibal. Nor is this all. The discoveries of Pompeii and Herculaneum present a fearful weight of evidence, in addition to that which literature had previously furnished, that among the Romans the vice of cruelty was attended with its twin vice of licentiousness." If virtue, as Tacitus and Pliny tell us, was not to be found in Rome—it is certain that Pompeii was not the place to look for it. "The foulest epigrams of Martial, the grossest descriptions in Petrinius and Apuleius, are illustrated in the remains of those cities, in sculptures and pictorial representations which cannot be described, hardly alluded to. What must be the tone of conversation and sentiment, and the standard of morals in a community where such abominations were tolerated, not to say, favored? There is much in the character and history of the Roman people which we may justly admire—their energy, their perseverance, their constancy in adversity, their political wisdom and their executive and legal ability. But we are not called upon in so doing, to overlook the most obvious moral distinctions, and insist that the influences which formed their civilization were as efficacious in training the individual to excellence as in making the nation powerful."

Bank of British North America, Victoria, B. C.

Mr. Walter Grose, of Montreal has been appointed sales agent for Quebec and the Maritime Provinces for the Gurney, Tilden Co., of Hamilton.

CORRESPONDENCE.

Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

CANADIAN VS. FOREIGN CEMENT.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—I have read with interest the editorial articles published from time to time in your journal anent the opening which appears to exist for the extension of the Canadian Portland cement manufacturing industry, and the comparative quality of the home with the imported article. While I am free to admit that a great improvement has taken place in the quality of Canadian Portland cement, I am nevertheless not prepared to agree that it is equal in quality to the best English and German brands. One of the most important qualities in good English or German Portland cement is that its strength will steadily increase for a period of six months. Canadian cement compares favorably with foreign cement in this particular for about three months, but shows little or no increase in strength beyond that period. I am of the opinion that the trouble with the Canadian cement lies in the method of grinding—that it is overburned, so that in the grinding it is all reduced to an equal degree of fineness, leaving no residue, as is the practice of foreign manufacturers.

A USER OF CEMENT.

In answer to enquiries addressed to Canadian Portland cement manufacturers for information on the line of the charge of inferiority in strength of Canadian cement contained in our correspondent's letter, we have received the following communication:

SIR,—We are favored with yours of the 24th inst., in which you kindly call our attention to an argument which is being used by dealers in foreign cements in order to prejudice the sale of Canadian cements, based upon the allegation that the native article does not increase in strength for as long a period as the foreign, the contention, as you say, being on the part of these gentlemen that the foreign article continues to increase for a period of about six months, and that the Canadian attains its greatest strength in about half that time. Our answer to this is simply a denial.

The facts are not at all as stated, as actual experience has over and over again proven, and we defy the traducers of Canadian cements to prove their assertions.

Portland cement can only be made from carbonate of lime and clay. Our raw material has proved upon chemical analysis to be unsurpassed. We have adopted the latest English methods of manufacture, and we grind, in accordance with the requirements of Canadian engineers, very much finer than the average English manufacturer. The effect of this is to give us the best attained results, and results, as our testimonials show, in advance of the great majority of imported cements, and equal to the very best anywhere.

Our competitors have assumed without proof that because our cement in a thirty days' test so much surpassed that of most foreign cements, that foreign cements continue to increase in strength until they reach our standard or surpass it, an assumption easy to make, but which they have never proved, and which takes time and much trouble to disprove, and which is therefore made without fear.

Even if it were true that the imported cement requires six months to reach a degree which ours reaches in three, that by no means establishes its superiority, unless it could also be shown that the Canadian carried some elements of decay, which has never been contended.

We are aware that some persons, from qualities inherent in themselves, prefer goods that come from afar and which cost more money, and are always willing to discredit and disparage a home product in favor of the foreign. This phase of human character is a very old one and we think it answerable for any preference now shown to foreign over Canadian cements.

Actual tests and experience have demonstrated that there is nothing in their superiority. We will have pleasure in sending you our latest testimonials as soon as received from the printers. Again thanking you for your courtesy,

Yours very truly,
THE OWEN SOUND PORTLAND CEMENT CO., Limited.
Per Geo. S. Kilbourn.

A REPLY.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—You publish in your last issue a letter by Mr. Arthur E. Wells, entitled, "The Ontario Association of Architects and What It Should Do."

Mr. Wells' letter is so overloaded with sarcasm that it is difficult to keep track of his argument, but in conversation with him I find it to be this: The Association has devoted itself to the theory that by making a higher training for architects compulsory, calamities from the failure of buildings will be diminished; but, 1st, such failures "are due quite as often to carelessness or oversight as to incompetence," and, 2nd, granting carefulness as well as competency to members of the Association, there are still "the other fellows," who are not members, but have a right to build. Therefore, Mr. Wells concludes what the Association ought to do is to turn their attention in another direction, viz., to an agitation which would lead to the establishment in the cities of Ontario, "of effective building laws compiled by experts, and a Department of Buildings competent to secure their strict enforcement."

That is in its way a good suggestion, and indeed the Association has already been working in that way. A complete set of building and fire by-laws, the work of several sittings of the Building By-law Committee appointed in 1895, was submitted to the Toronto City Council when the Toronto building law was amended in that year (after the fires in which the Globe office and the Simpson building were destroyed), and all the cities of Ontario and some of the towns have been invited to make use of the services of this committee in amending or enlarging their building by-laws.

If Mr. Wells wants to do good by writing, let him turn his attention to the local newspapers of the Ontario cities, and urge them to press upon the attention of their municipal councils the advantages of this offer on the part of the Building Committee of the Association. It is the small end of the affair, but a good man devoted to the small end of the matter will be of the greatest possible service to the large end, which, I think, there can be no doubt, if I may say so when Mr. Wells has just expressed a doubt on the subject, is the elevation of the profession of architecture. It is surely unreasonable to provide for the correction of errors rather than their prevention, yet this is the essence of Mr. Wells' proposal that legislation should be devoted, not to the qualification of architects but to building laws and building inspection. The herculean figure of the building inspector who would contain in himself all knowledge to detect and all power to arrest error, appeals to the imagination; but, as a matter of fact, he might fail to appear, and it is wiser in this as in other things to begin at the other end, and look out for the prevention of errors by fostering the growth of the architect, who is the fountain of everything.

There is something in what Mr. Wells says that "accidents in building operations are due quite as often to carelessness or oversight as to incompetence," but it is recognized as a matter of experience that the best designers are the most exact about their drawings, specifications and superintendence, and the surest way to prevent even errors of carelessness is to attend to the qualification and status of the architect. If as Mr. Wells very truly says what architects most want is "grace to see that they have embraced an art and profession which is rich in interest," one sure way of doing it is to make the title "architect" an attainment involving the possession of the knowledge and cultivation of mind, which alone give the power of being possessed by the interest of architecture. Without them the practice of architecture can only be the process known as "getting up a set of plans," a process which is bad for everybody—for the man who does it, for the man who owns the product, but perhaps most of all for the weary public.

Yours truly,
W. A. LANGTON.

QUALITIES OF FIRE-PROOFING MATERIALS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—In Mr. Gagnon's interesting critique, in the March number of your journal, of my convention paper, he is evidently under some misapprehension, or has not read the paper as carefully as he might.

In no respect have I advocated the Maurer system in preference to terra cotta construction; I merely quoted the report of the test, and I must say I was mystified by the reputed failure of the terra cotta arch. Since my paper was presented, I have seen, however, the statement of Mr. Frank, explaining the very defective workmanship which was allowed, either by design or carelessness, in the construction of that arch, and which fully explains the cause of failure, which was inevitable under the circumstances.

Mr. Gagnon must have overlooked my summing up of the lessons of the Pittsburg fire, wherein I have placed porous terra cotta in the first place as a fire-resisting material, hard tile second, and concrete third. With regard to asbestic plastering as a fire-resisting material, I must say, as I said in my paper, that I would like to see it tested under as severe conditions as the New York tests. Till this is done architects will hesitate to adopt it in preference to present fire-proofing methods.

Yours truly,
EDMUND BURKE.

PREACHING VS. PRACTICE.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—I have read with much interest a letter in the CONTRACT RECORD by "A Young Architect" re the stand taken by some architects in regard to competitions, ethics, etc., and I would like him to know that he is not alone in the opinions he expresses. I have very often been amused at the way some prominent members of the profession waste time and wind expressing themselves on these matters. As for "professional ethics," some of them should try and find out what it means or shut up. We out in the wild woolly west often hear reports of architects in the cities tumbling over each other, so to speak, to get work; of how they enter competitions that no thoroughly professional man would have anything to do with, and then we hear them in solemn conclave on competitions, ethics, fees, etc., etc.

Just a couple of instances that came under my own notice: A down east architect wrote out to the west offering to supply plans, specifications, etc., for a $25,000 building—not a warehouse either—for an amount equal to $\frac{3}{8}$ of 1%. Another entered a competition for the same class of building, and after capturing the prize his plan was rejected when tenders were received. It was going to cost several thousand dollars more than his estimate. He was quite a prominent man, too.

And these are the men we young fellows are expected to sit at the feet of and learn! Trusting some of them will set us a better example or stop inflicting their precepts on us (perhaps you could eliminate the precepts from the CANADIAN ARCHITECT AND BUILDER.)

Yours truly,
ANOTHER YOUNG ARCHITECT.

THE CITY GARDEN.

BY W. A. LANGTON.

IT is hard to over-estimate the importance to a building of the treatment of its site. In fact, the buildings that occur to one as impressing the minds of travellers with their idea have all some characteristic advantage of site. St. Mark's of Venice would always be a wonderful study if one had to go up a lane to see it; but how much of the impression it has made upon the world is due to its beautiful site? Every traveller in search of impressions prefers the English cathedrals to the French, though no one doubts that the French cathedrals have greater architectural perfection. The French cathedrals stand on the street like warehouses, and there is nothing about them to tune the mind to harmony with the purpose of the building but "the reverend smell of incense" that sometimes greets one on entering; but, before entering an English cathedral, one turns out of the streets into the venerable Close, where, except at service time, when the place is full of the sound of bells, the church is surrounded by a solemn quiet. There is nothing in France so full of religious feeling as an English cathedral and its close. Indeed the actual buildings might, with such surroundings, be less noble than they are and still produce their effect. In the Inns of Court in London there is, except for the Temple Church and a hall or two which date from the time of the Templars, no architectural pretension whatever. What building has been done, since the district fell into the hands of the lawyers, is of an unrelieved plainness; built in the dullest period of architecture, of the commonplace and monotonous London brick, now dingy with age. Yet the Temple Courts have a charm because they are courts; they are a conception and have a place in literature. To turn out of Fleet street with its crowds—I will not say noise lest it might be thought to compare with the roar of the trolley car, beside which the London hum is velvety, like the sound of a city heard in a dream—but Fleet street is bustling, and to turn out of it into these quiet courts is to receive an impression which architecture might increase but which is there without it. These are large illustrations of the importance of site. For this reason they first attract attention to the question, but, when the lesson is learned, one sees abundant illustrations of it on a smaller scale; the village church in its churchyard is just as much a conception as the cathedral in its close, and the courtyard of an inn as the Inns of Court. The lesson appears to be that it is not unusual beauty in the site that emphasizes a building so much as harmonious character. When the site has great natural beauty it is necessary that the building should adorn it, and it is the character of the site that governs the character of the whole. Durham Cathedral, on the edge of a bluff overhanging a winding river, is beautiful and worthy of the situation; but a castle would have become the situation as well or better. The ideal cathedral, as a cathedral, is not Durham but Salisbury, set down upon a plain, with no natural distinction of site from any other building in the same county, but made so distinct by the environment made for it by its builders that it is cited as the ideal English cathedral. This is the kind of site that we have to consider under the head of gardening. This is the everyday problem,—to create an environment, and it is a problem for the architect to include in his plan.

Because it is said that God made the country and man made the town it is sometimes supposed that towns should try to look like the country; but God made man too, and to the artist, the poet, to whom it is given to enjoy truth, pure country and pure town seem to be equally objects of delight. In villages, which are a sort of border-land between town and country, one admires a certain freedom that leaves it in doubt how much is due to nature and how much to man, but in towns there should be no such doubt; we want to feel the hand of man everywhere, and, of the two great divisions under which gardening is classed and about which there has been much controversy, whether landscape gardening is right or formal gardening right, there is no question but that formal gardening has a place in towns. To many people the term "formal gardening" brings only a vision of trees cut into the shape of cocked hats and teapots. It was formal gardeners who committed these follies but they are not an essential of the art. Landscape gardeners committed follies too. The judicious designer follows neither one nor the other exclusively but adopts the principle of each when it is suitable. In the parks of a city there is room for landscape gardening, but for the small amount of ground connected with private houses and for streets formality is the key. The picturesque is impossible for us because our work is new; we want a treatment that will give us beautiful streets at once, and the picturesque which delights cannot be fabricated. In all beauty there is an appeal to the mind as well as the eye, and the deviations from the regular which constitute the picturesque must, in order to please, be recognized as accidental. To be recognized as done "accidentally on purpose" is to weary instead of please. The picturesqueness that pleases us in older countries is, besides the mere charm of novelty, either the result of a freedom from regulation which is out of the question now-a-days, or of the adaptation of ancient arrangements to modern uses, and the resulting character in either case appeals to the mind in a way that no purely modern work can. But the appeal of formality is direct. What meets the eye is arranged to please the eye, and the intention is part of the pleasure. There may be some controversy as to whether, when trees are full grown, the approach to a house is more pleasing if winding through an accidental arrangement of trees or by an over-arched avenue of trees with tree trunks closing up in perspective; but there is no question that an approach winding among scattered saplings is nothing, while there is some effect of dignity in the formal arrangement of the youngest trees. It is the intention which is gratifying.

For a young country, then, formality is freedom. The hand of the designer, which must be apparent in modern work, can here appear freely. The mere effort, so long as it is properly directed, counts for something. But the proper direction is everything. The effort must be an effort to dignify some need which is recognizable. The adherents for formal gardening in England, when writing on the subject, occupy most of their space in quoting from ancient works on the subject and in referring to old examples still existing, and this not as illustrations of principles but as examples of what ought to be done now. The same mode of life in the main still goes on in England, substituting for ancient terms, such as the bowling green, modern terms such as the tennis lawn, so that no doubt these guides are reasonable; but to us who live in cities the whole arrangement of these gardens for country mansions is foreign. We are more likely to get direct examples of what we want from an English cottage, or a not too-French French garden. But the essential thing is to regard no example as an example of anything but the principle, and of methods in handling details.

The leading idea is bound up with the word "garden" in its original sense rather than in that which we usually attach to it—a place of trees and flowers or vegetables and fruit. The original form of the word is said to have been "garth," an enclosure, still in use to describe the space enclosed by cloisters; and the essence of the formal garden is the enclosure of a space about the house which is connected with the house rather than with what is beyond it, and partakes of the character of the house. For this reason, walls, gates, paving, steps and balustrades form as great a part of the consideration of gardening as do growing things.

A wall of some kind one might almost say is essential. This statement will stand for the present century. When the brotherhood of mankind, typified by the American elimination of boundaries, is accomplished, it may be necessary to modify it. At present we love one another as members of a grown-up family, who are better in separate apartments; and the American system serves chiefly to display as much as possible of one's own house and to make one's neighbor's lawn look as if it were our own—which is being artful rather than artistic.

A mere curb will answer the purpose of marking

division, but there is a great deal to be done with a fence if it is made a feature. Wood is not sufficiently durable to form as it were part of the grounds. It is suitable only as a support for a hedge until it is fully grown. This does not take as long as is supposed. A privet hedge planted in the year 1887, and then a scanty row of slips about two feet high, has been for the last two or three years a complete screen from passers-by, although it has been kept clipped to an even outline. It is healthy and grows thick and evenly. It has still a small picket fence about two feet high to protect the roots from the street, and this, though perhaps unnecessary, has a good effect. If the fence were brick it would be better. A brick wall by itself, if of the full height of the gate, is rather unnecessarily forbidding, and will confine the view from the ground floor windows unless they are well up—as they ought to be in town. A better arrangement is a low brick wall with an upper part of wrought iron. The brick wall finishes at the entrance with gate piers, and the gate may be wrought iron. A wrought iron arch over the gate is in England a common survival of a practice when a light hung over the gate. At present it serves chiefly to carry a creeper which runs along the fence and over the gate. This creeper is in France also a common accompaniment of the wrought iron fence, and is always interesting; its festoons introducing into the regularity of the fence some spontaneous lines, or serving the purpose of contrast of line, like the swag in a cornice. But a better arrangement is to plant a hedge behind the fence. In this case we get all the the beauty and variety of the wrought iron topped fence and its advantage in strength, while making it perfect as a screen by a green background which is more beautiful as a finish on the inside than a brick wall would be. In this case, where the fence is a screen to the height of the gate, logic demands a solid gate also.

There are many shrubs, no doubt, besides privet that would make a good hedge in this country. There is a cedar hedge 15 feet high not far from Toronto, which is thick and healthy, and, when well trimmed, makes a good mate of the tall yew hedges of which one reads in descriptions of old English gardens. Barbary thrives also near Toronto in hedges about 6 feet high.

It is common in England to finish a yew hedge at corners and openings by allowing a tree to grow up at these points and trimming it to a regular shape. The teapot and cocked hat have done service in this position, but it is not necessary to pay them any tribute; a simple conical form with a projecting top is enough for emphasis and to appear as part of the hedge.

In a street of London, where there is more to be gained by screening one's self from the road than by securing a clear view of the road, there is an artist's house which has a low brick wall (acting as a retaining wall), a wrought iron fence above, with a hedge behind, and, in addition to this, a row of pollarded Lombardy poplars. The combination of all these parts is very interesting and remains in my memory, though I have quite forgotten what the house was like. The house was perfectly visible between the trees. The interruption made by the foliage of the trees came about the level of the bedroom windows and acted as some protection to them.

It is this kind of partial screen that one wants. Just so much screening as to make all parts of the houses not equally visible at the same time is both a gain to the beauty of the street and accomplishes for the houses all the protection from passers-by that is necessary. It is not necessary to wall in a house completely from all eyes, but only to place such partial obstructions in front of it that, as a spectator passes by, the view of any one portion is obstructed from time to time. It is possible to view the house as a whole while moving, but it is not possible to see the whole house without stopping for the purpose.

Poplars are also useful as a boundary between lots, because they have so little spread. The disadvantage of growing an elm or maple on a boundary is that the act is not a self-regarding act; the tree spreads as much over our neighbor's property as over our own, and our neighbor may not want it. The Lombardy poplar will give him only its shadow, and not much of that if we pollard it. There is much to be said for pollarded trees. They are manageable; one can confine them within prescribed limits, not only laterally but vertically. What we want from trees is a certain amount of screening from the sides and a certain amount of shadow; but not to keep the sun and air from us, nor to cast all below them in shadow; and the pollard answers these purposes. With them one can protect grounds from being overlooked without cutting off light, air and sunshine. As far as shade goes, a little maple 20 or 25 feet high will give shade enough for a family to sit under if they move their chairs according to the time of day.

For continuous shade, which is also desirable, the practice of pleaching is effective. In one of Miss Alcott's letters she writes: "Father would have enjoyed the pleached walks, for they are cut so that looking down on them is like a green floor, and looking up it is a thick green wall." On an ordinary scale such walks are described as 8 to 10 feet broad and 12 to 15 feet high, with trees 4 feet apart. It is necessary to have a rough frame of wood or iron to start the trees on the required lines. The boughs are then wreathed together and clipped. In France such walks are carried out on a large scale. Versailles is approached by miles of avenues with trees interlocking overhead, and in many other places the trees on the public promenades are treated in the same manner. The trees are spaced as widely as five paces on centres and brought to a flat top about 40 feet high. The arcading is sometimes done in a very perfect manner, forming pointed arches between the trees both longitudinally and transversely. The trunks and interval branches are kept entirely bare, so that there is in effect a continuous vaulting of bare limbs finished on top with a flat canopy of leaf-bearing twigs, which are also allowed to extend down the outer sides for some distance. The lines of the branches have of course sufficient wilfulness to prevent a monotonous regularity, but the hand of man is discernible both in the formality of the arrangement and in the character of the branches. These latter are gnarled or knotty with pruning. This description does not sound pleasing, but they are attractive to the artist's eye; there is an effectiveness about their lumpy, swollen ends which is comparable to that of the blob ended line that the artist himself affects.

There is an advantage in thus keeping trees within bounds on the streets as well as in private grounds. A street overarched with elms as in some old towns in the United States is not, as might be expected, cool in summer. The gain in shade is more than off-set by the check given to currents of air, which are the only real source of coolness on a hot day. Very tall trees are moreover not perfectly safe neighbors for houses. In open spaces trees may be properly allowed to grow to their full height, and in Canadian cities there are fortunately so many of such spaces that in stating objections to fully grown trees one need not feel that one is forbidding them the town.

There might doubtless be much more said, by an experienced gardener, in the way of suggestion about the materials for architectural gardening; but not many materials are required, and there is only space to say a few ungrateful words about our old friend the Virginia creeper. It grows rapidly and is beautifully colored in the autumn. It can also stand more severe exposure than the "Boston ivy." But it needs much training, and is dishevelled in appearance even when cared for. The Boston ivy only requires fostering at the first and can then take care of itself. It will follows the lines of a building so closely that it seems as if the stems had been cast to fit the variations of surface. It is an ideal architectural plant, and might be specified by architects like any other ornament.

It is not proposed to enter now into details of the treatment of the ordinary street front problem. It is not a difficult problem nor can it be so varied as are the possibilities of treatment of the private grounds on the other side of the house. One thing clearly ought to be more often done and that is to bring carriages up to the front door, instead of to the sidewalk 40 feet away. How to do this is not so difficult a problem as to tell why it is not oftener done. A greater difficulty consists in dispossessing the servants of the back of the house so as to utilize the extensive piece of ground that is so often wasted there. How to make both the front and back elegant and still find room for coal delivery, scavenger's withdrawals, drying clothes and other proceedings which neither the public nor the owner's friends are invited to view, is a difficult problem and for small houses perhaps impossible; but it has been done in fifty feet of frontage, and an enthusiastic planner surmounts the insurmountable so often that, if architects would give their minds to the grounds as much as to the house, we might see much more made of them than we do now, both as features on the street and as places for retirement out of doors.

STUDENTS' DEPARTMENT.

PROFESSIONAL INSTRUCTION.

THE irreducible minimum of knowledge necessary for those who practice architecture has been rather obscured by the attempts to raise the qualifications of its members. Instead of teaching a few things well, authorities on professional education have been tempted to put before the student a large number of subjects more or less allied to the calling of architects, for which only a superficial knowledge can be expected. This attempt to raise the qualifications of the architect has rather defeated itself by keeping a large number of students back from an ordeal they are not willing to undergo. Imagine an architect's pupil attempting to become proficient in such varied and opposite sciences as chemistry, mathematics, physics and geology, by a course of lectures, to be followed by another course treating of building construction, and the various trades and arts of which it is composed. No doubt an intelligent youth will acquire a general smattering of these subjects, but of what practical use or application is a question of doubt. If they are gone through before he enters an architect's office, it is ten chances to one that he will quickly forget all he has learned by the time his term expires, and that during his pupilage he will relieve his mind of all his school training. Is it at all probable that a pupil will trouble his head about the mathematical principles involved in a piece of construction he may be engaged on, or that he will be able to apply his mechanical learning to the stresses of a roof or the equilibrium of an arch, etc. It is very doubtful whether he retains in his memory the rules he learned respecting the composition and resolution of forces, and the application of those principles to practical building. Does he remember the principle of "moments" sufficiently to be able to put them to any account? How far, too, does his knowledge of geology come to his aid when he is visiting any building?—or his chemistry help him in his study of the solvent properties of acids on stone? It seems to us much of the practical value of this pre-pupilage training is almost lost, except, indeed, as a discipline, and all educational methods are valuable as disciplinary. In fact, school or college training can give all that is necessary in a general academical sense. Far better to postpone the professional course till the actual time of pupilage, and the second year of the term seems to be an appropriate time for the pupil to begin a course of instruction on these subjects, so that they may be carried on concurrently with his practical office work. If this could be managed agreeably to the master, and without overtaxing the pupil, what a gain it would be to the student, for the course of studies could be so arranged that it would help the student just when he is beginning to pick up his facts and experience. He wants to know, for instance, why walls of brick are made of certain thicknesses, generally by additions of half a brick; what bond is; why footings are formed as they are; how concrete and mortar are made. At that very time he would learn the rationale of the whole thing. Natural doubts as to the composition of brick, the varieties of stone, the qualities of timber, would speedily be set at rest by lectures on these subjects, which no master could afford to give himself. As he advances in his office experience, he wants to know why this and that is done? why roofs and partitions should be framed as they are? and a hundred other questions of a constructive kind will suggest themselves for solution. At this juncture the student will begin to feel a real interest in discovering the reasons why and wherefore. He will find his progress wonderfully assisted by the alternate aids of the drawing desk at office, and the class-room lecture or demonstration; by having to draw the construction to scale, and hearing the theory explained. Thus, theory and practice will go on hand in hand in hand, and the mathematical demonstrations will, having something practical associated, be more clearly understood and remembered than if given as a school subject months or years before the practical exemplification appears.

But, it may be asked, what ought the minimum attainments to be? We answer, just sufficient mathematics to enable the student to work out a formula, or to solve equations on structural questions; just enough mechanics to enable the student to determine the stresses of a structure of stone, timber or iron. Sufficient geological knowledge may be given to enable the pupil who has any curiosity to find for himself to what particular stratum or formation a particular stone belongs, and from what bed it has been obtained, and to know the varieties and properties of the great limestones and sandstones of his country, at least. To expect a young man who has a dozen or more very practical subjects to take up and become familiar with in a short period, to know more, is to expect him to do an impossible thing. Of what immediate use, for instance, would it be to question him on the specific gravity and chemical constituents of any of the Plutonic rocks or greenstones, or in what strata the serpentine rocks of Canada are to be met with, in what series, or in what group. It will be enough if he knows sufficient mineralogy or chemistry to enable him to describe the mineral character, the specific gravity, the percentage of silica, lime and other properties and durability of stones which are in use every day. In physics, ventilation, heating and sanitary science, he ought to know sufficient to understand all that is necessary to healthy habitation and construction; all beyond we should advise him to defer until after his term has expired, and he thinks of preparing for one of the professional examinations, when a more advanced and comprehensive course might be gone through at the option of the candidate. Till this period arrives, we think the pupil's attention and study should be limited to a few of the main scientific facts and principles of his art, and these should be learned thoroughly instead of being mixed up with a lot of irrelevant matter that may never be wanted, or, what is quite as stupid, their points of application to architecture and building obscured or lost sight of amid a vast number of distinctions and details. The courses of instruction given at Queen's College, University College, and at the technical school and colleges in London afford the pupil facilities for carrying out the arrangement we suggest.

In this connection we may mention a bill, the sections of which are before us, providing for the examination of architects and regulating the practice of the profession in the state of Illinois. The Ontario Association of Architects have already taken a similar course. The examination will have special reference to the construction of buildings, and will test the knowledge of the candidate in the strength of materials, and as to his ability to make practical application of such knowledge in the ordinary professional work of an architect, and in the duties of supervisor of mechanical work on buildings, especially in the laws of sanitation. The bill has passed the legislature, and is a proof that trans-Atlantic architects are beginning to see the advantages of a certificate of competence.—The Building News.

COLORS AND THEIR AFFINITIES.

Black upon white shows nothing lost.
White upon black gives a very bad cast.
Blue upon red is a purplish hue.
Red upon black brings a brownish stew.
Green upon blue is the color of bog.
Blue upon green shows the color of logs.
Brown upon black gives brown very dark.
Black upon brown is the color of larks.
Purple upon lake the lighter it takes.
Yellow upon white gives a very clear cast.
White upon yellow brings a much shorter last.
Brown upon yellow shows a bismarck tone.
White upon brown is as cold as the zones.
Red upon pink some use for the ground.
Pink upon red will not go down
Silver upon all colors used in cheapness lies.
Gold upon all colors will always harmonize.

FAMOUS DOMES.

HERE is a list of the principal domes of the world and their dimensions, showing the importance of that of Mosta:

St. Peter's, Rome, is 333 feet in height, with an interior diameter of 137 feet.

The Pantheon, Rome, is only 146 feet high, but it has a diameter of 142 feet inside.

St. Maria, Florence: Height, 275 feet; diameter, 137 feet.

St. Paul's, London: Height, 220 feet: diameter, 108 feet.

Santa Sophia, Constantinople: Height, 182 feet; diameter, 107 feet.

The dome of Mosta is 200 feet high and 124 feet in diameter, sixteen feet larger than the great dome of St. Paul's.

One of the largest domes in India, the land of domes, is that of Gol Gomuz at Beejapore, which is 175 feet high and 124 feet in diameter, ranking like that of Mosta, between St. Peter's and St. Paul's. The exterior height is 198 feet. This dome covers the tomb of Mohammed Shah, the sixth king of the Moslem dynasty in Beejapore, who died in 1689, so that the building is nearly contemporary with St. Paul's. The name signifies the "Rose Dome." The Sultan is buried under it with the simple inscription, "Sultan Mohammed, a dweller in Paradise."

The first bas-relief in terra cotta is said to have been made by the King of Sicyon, his daughter having traced on the wall the outline of the face of her lover who was about to leave her. It was then filled with clay by the king, and afterwards baked in the furnace with the tiles.

We learn from Indian Engineering that the grand ancient mosque near Masti Gate—the only relic in Lahore of the Pathan period—is undergoing repairs. A local paper has condemned the bad taste that has prompted the replastering and lime-washing of the outer walls. It is said that some of the best preserved specimens of fresco painting, of what we may call the Pathan school at its best, is to be found in this Musjid. Unfortunately, the repairing masons have desecrated the work of the old masters by laying on big blotches of flaming, flaring colors.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Built-up Timbers.

THE recent accident in London, Ont., should remain an object lesson to all builders who may be called upon to form long timbers by "building-up." A proper disposition of the butt joints should be insisted upon, and the character and quality of the timber should be subject to the closest scrutiny in order that sound and suitable joists may be selected for the purpose. While it does not always follow that a clear joist is always the strongest or best to select, it is an absolute certainty that a joist having a knot in it is not so strong as one devoid of knots, other things being equal. Many a clear joist has been so cut at the mill that the line of grain may "cross" the width of the joist at distances varying from twelve to four feet. Now, it must be evident to any one having a knowledge of the strength of timber, that a joist having the grain of the wood running at an angle from its edges cannot in the nature of things be as strong in resisting a transverse strain as one having the fibres running parallel with the edges and sides of the joist. Here, then, is a pointer worth knowing, for many a fine piece of timber, suited perhaps, for the finest of joiner's work, may be totally unfitted to become a part of a laminated beam that may have to bear a heavy transverse strain. Again, a joist being "curly" in the grain should be discarded on sight. A curly piece of stuff is the most deceptive of all—it may look well, but is generally short in the grain. A "brashey" joist, as well as one showing any signs of doze, should not be used, neither should a joist having sap or wane on either edge be permitted to form part of the beam. Perhaps the worst Canadian timber that might be employed in laminated beams, is hemlock; it is "brashey," short in the grain, and not strong transversely; indeed, it ought not to be employed in any position or in any form, when it may be subjected to heavy transverse pressure. While being a very useful wood in many places, it should be avoided in beams. Norway or Southern pine, of the softer woods, seem to be the best adapted for beams that have to undergo much stress, and they have the quality of resisting fire about as long as most woods and are not subject to injury or degeneracy because of being constantly under strain, like most other woods. It is not good construction to bolt laminated beams; it is better to spike them or to clamp them together, as bolting requires removal of timber, thereby weakening it, and renders it impossible for each lamination to do its own share of the work, as it may be hung on the bolt at some point, and make its neighbors carry a share of its burthen and thereby cause a rupture which may lead to serious consequences. Too much care cannot be exercised in building up beams.

Some Working Hints.

THE framing square in general use among mechanics may often be used as a calculating machine if the one using it is thoroughly acquainted with its capabilities. The long arm of the square is called the blade, the short arm the tongue. On the side shown in Fig. 1 there is a diagonal scale on the tongue. This is for measuring off hundredths of an inch. The lengths of lines between the diagonal d e and the perpendicular e f are marked in the latter. To take off 3-10ths and 4-100ths of an inch, place the compasses on the dots on the fourth line. 7-10ths and 3-100ths of an inch is formed on line 3. 1 inch, 8-10ths, 5-100ths is the distance shown on line

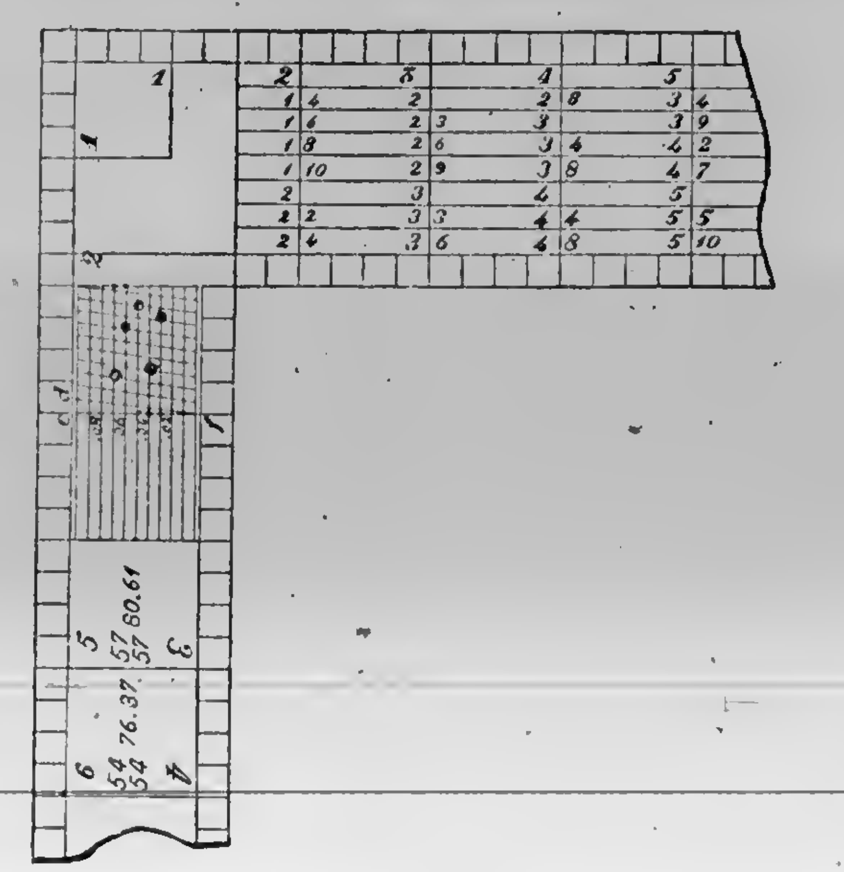


FIG. 1.

5. The brace scale or rule is always on the tongue. This rule is easily understood; the figures on the left of the line represent the "run" or the length of two sides of a right angle, while the figures on the right represent the exact length of the third side of a right-angled triangle, in inches, tenths and hundredths. The exact length of a brace with a run of 57 inches in the post and the same distance in a beam, would be 80-61 inches; this is the length between shoulders. The vertical rows of figures on the blade constitute what is known as the "board measure." The superficial contents of a board are found thus: Suppose the board to be 13 feet long and 15 inches wide. Look for 13 under the 12-inch mark on the inch scale; follow the line this 13 occupies till under the 15-inch mark, the answer, 16 ft. 3 in., is found. A useful addition to the steel square in solving mechanical problems is what may be termed a "fence." This may be made of any hardwood as follows: Dress a piece of wood to 2" wide, 1⅝" thick, and about 2' 10" long; run a gauge line down the centre of both edges; this done, cut a saw kerf along the gauge lines, leaving a solid piece about 10 inches in the centre; this, of course, necessitates the kerf to begin at each end of the stick. The square is then inserted in the kerf, the blade on one side of the solid centre and the tongue on the other, the fence itself forming the third side of a right-angled triangle, the blade and the tongue of the square forming the other two sides. The next step is to make some provision for holding the fence tight to the square. This is best done by putting No. 10 1¼" screws in each end of the fence close to the blade and tongue. The next thing will be to apply the square in its present condition for the purpose of obtaining the lengths and bevels of braces and rafters. Adjust the square and fence as shown at Fig. 2, and place it on the prepared stuff as shown in

FIG. 2.

Fig. 3, in such a manner that the mark 12 on both blade and tongue coincide exactly with the gauge line o, o, o, o. Hold the square firmly in the position now obtained until the screws are tightened over it. We are now ready to lay out a brace. The gauge line o,o,o,o, over which the figures 12, 12 stand, is ¾ of an inch from the edge of the stuff, and is intended to admit of a flat or bearing point on the end of the brace called "the toe of the brace," as shown in the diagram. Slide the square to the left as shown by the dotted lines at X, mark with a scribe or fine pencil on the outside edges of the square, cutting the gauge line. Slide the square to the right until the 12-inch mark on the tongue stands over the knife mark on the gauge line. Mark the right-

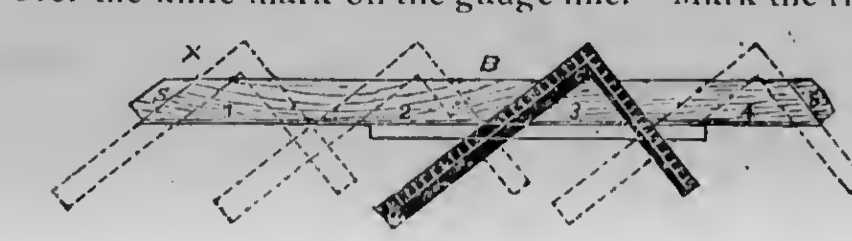


FIG. 3.

hand side of the square, cutting the gauge line as before; repeat the process four times, marking the extreme ends to cut off, and we have the length and exact bevels of a brace for a four-feet run. Square over, with a try-square, at each end from the gauge line, and we have the toe of the brace. The lines S S shown at the end of the brace represent the tenons that are to be left in the braces when such are necessary. Where a number of braces are to be cut, as is often the case in heavy timbered buildings, such as barns, workshops, saw mills, etc., it is always best to make a pattern out of a piece of thin pine or other suitable wood for each "run," and nail a strip or fence on the working edge of it as shown at K. The pattern can then be used from either side, and being the exact length and the bevels being correct, one man can lay out braces faster than six men can cut. In order to show the principle on which this rule is based, the brace is shown in place at Fig. 4; the dotted lines show the position the square was in when the pattern was laid out. It may be necessary to state that the square as now arranged will lay out a brace pattern for any length if the angle is right and the run equal. Should the brace be of great length, however, additional care must be taken in the adjustment of the square and its application, for should there be any departure from truth, that departure will be repeated every time the square is moved, and where it would not affect a short run it might materially affect a long one. Let us lay out a brace for an angle when the run in the beam is three feet and the run down the post four; proceed as follows: Prepare a fence of thin stuff for a pattern same as before; run a gauge line on it; lay the square on the left-hand side; keep the 12-inch mark on the blade over the gauge line; place the 9-inch mark on the tongue on the gauge line, so that the gauge line forms the third side of a right-angled triangle, the other sides of which are nine and twelve inches respectively. Proceed as on the former occasion, and as shown at Fig. 5, taking care to mark the bevels

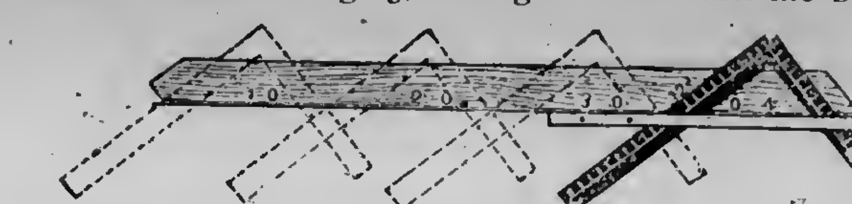


FIG. 5.

at the extreme ends. The dotted lines show the positions of the square as the pattern is being laid out. Braces for any unequal runs, if the angle is right, may be obtained by taking proportional figures on the square as gauge points, to suit the conditions. Fig. 6 shows an unequal brace in position, the dotted lines showing

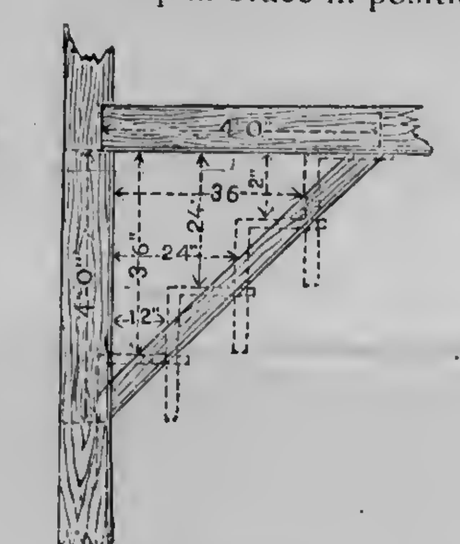


FIG. 4.

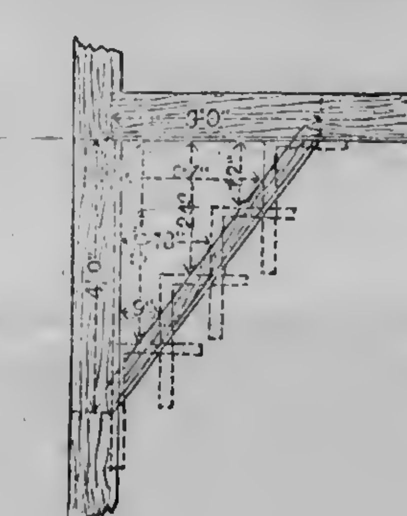


FIG. 6.

where the square was placed when the pattern was forming. There are many other things, equally important to laying out braces, that can readily be performed by the use of the steel square, and in future issues attempts will be made to describe some of them.

SILICA PORTLAND CEMENTS.*

BY M. J. BUTLER, O.L.S., M. Inst. C.E., M. Am. Soc. C.E., M. Can. Soc. C.E. Deseronto, Ont.

MR. Chairman and Gentlemen: If it be true that the man who makes two blades of grass to grow where one formerly grew is a public benefactor, then in that case F. L. Smidth & Co. should be considered public benefactors, for they have discovered a means by which it is possible to take one barrel of cement and make two of it with increased strength at the same time.

The first thing to bear in mind is this, that in the grinding of ordinary Portland cement it is practically impossible to reduce it to such a degree that less than 10% residue will be left on a sieve of 10,000 holes to a square inch; that when tested on the 40,000 mesh sieve, not more than 75% of it will pass that sieve, leaving 25% residue; that the residium on any sieve, however fine, has no cementitious property whatever. This is the fundamental principle which underlies sand-cement; that is to say, the unground portion of Portland cement is sand to all intents and purposes.

Now taking advantage of this fact, F. L. Smidth & Co., of Copenhagen, Denmark, who are the inventors and discoverers of the process, substitute for that unground portion of the Portland cement pure sand; it must be silicious sand, free from mica or earthy matter and feldspar and other soft or friable substances.

It is important that the cement itself be of the very highest

* Paper read before Ontario Land Surveyors' Association March, 1898.

grade—absolutely important. It is as important that the cement be good as in the Mannesman tube rolling process the steel be of the highest class to make a success of the actual working of the plant.

So, too, the sand should be clean; it must be pure Silica. Taking all the known methods of grinding up to the time of Smidth & Co.'s discovery, and it was impossible to grind by any known means to such a degree as is requisite for the successful making of sandcement. They invented the tube mill, and in order to give a proper understanding of it, I will briefly describe same:

It is a cylinder 25 ft. long, 48 in. to 50 in. in diameter, lined with cast iron plates, revolving at the rate of about 60 revolutions a minute. The tube itself is filled half full of flint pebbles. The pebbles are brought from Norway and delivered in Canada, and in all parts of the world where they are working under these patents.

The clinker is fed at a uniform rate into the tube mill. As it passes through the length of the mill revolving, it hammers itself together, the clinker and the balls revolving and pounding it, until they are ground to such a degree that the Portland cement ground, in this way, will leave not more than 10% residue on the 10,000 sieve and not more than 20 to 25% on the 40,000 sieve. Now that is about the practice required to grind Portland cement. When we mix sand and cement in equal proportions, we can now grind all of the cement to an impalpable degree of fineness, so you cannot find it on any known sieve, and the sand itself will be reduced to such a degree that not more than 4% residue will be left on a 10,000 sieve, and not more than 8 to 10% residue will be left on a 40,000 sieve. Consequently we now have every particle of active cement material in the cement acting upon a sharp, finely ground portion of silica.

In itself that minute particle of silica is stronger than any corresponding minute particle of Portland cement. The cement flour rubs around that particle of silica and has something to grip to, a sharp fine particle of silica. That is perhaps the explanation of the action of sandcement, and why it is that when you make a mortar composed say of Portland cement and ordinary commercial sand in the proportion of 3 to 1, that if you take that same Portland cement and grind one part sand with it, and mix this sand cement in the proportion of 3 to 1, and test it in the testing machine, the sand cement will beat the original cement from which it was made, and with corresponding economy to the consumer.

Of course, as engineers, in order that our clients may get the benefit of sandcement, we should satisfy ourselves by standard tests that the material is suitable for the work in hand, and then specify that sandcement will be accepted. Thus the client will get the benefit; otherwise the contractor will get the benefit of it, and he generally does, because he will bring his cement and place it before the engineer, who will test it and get the best results, and of course that is all he has to do with it, and the contractor is pocketing the profit.

On this continent probably the largest consumption of sand cement has been by the firm controlled by General William Sooysmith. On one contract 10,000 bbls. in the great cathedral of St. John the Divine, in the city of New York, was used.

I will read a test made by Prof. H. T. Bovey, at McGill University, Montreal:

Testing Laboratories, McGill University, Montreal.

Report of tests of "Ensign" Silica Portland cement—for the Rathbun Company, Deseronto, Ont.

1. "Ensign" Silica Portland, composed of Rathbun "Star" Portland and sand, ground together in the proportion of 1 to 1:

This Silica cement was mixed with standard sand in the proportion of 1 to 3:

(a) With rammed briquettes and the addition of 10% by weight of water, the tensile strength after 6 days = 189 lbs. per sq. in.
" " " " 13 " = 201 " " " "

(b) With rammed briquettes and the addition of 12% by weight of water, the tensile strength after 6 days = 178 lbs. per sq. in.
" " " " 13 " = 183 " " " "

2. Blowing test: The pats were mixed in the ratio of 16 of cement to 4 of water, by weight—the pats were subjected to hot vapor at 120 F. for 24 hours and were then submerged in boiling water for about the same time. The results were most satisfactory, showing no trace of free lime.

3. Fineness: Residue on No. 120 sieve = 7%
" " " 100 " = 6%
" " " 80 " = 0%
" " " 50 " = 0%

May 27th, 1897. (Signed) Henry T. Bovey.

To satisfy himself upon this matter, Mr. Henry C. Bamber, F.I.C., of London, England, selected a sample of English Portland cement without revealing its identity, and packed it in barrels sealed and sent to the Sand Cement Works at Denmark, of Homan Smith & Co. The seals were then broken in the presence of Mr. Bamber.

ABSTRACT QUOTED NEARLY VERBATIM FROM BAMBER'S REPORT.

The English cement was sifted in
200 sieve, 40,000 sq. inch. Residue, 39 p.c.
76 " 5,776 " " " 8.7 p.c.

Sand was sifted through 20 sieve, 400 per sq. in.
remaining on 30 " 900 " " for comparative standard tests, using only what remained on the 30 sieve.

The sand cement was made from usual clean sea sand. All the sandcement left about 3 p.c. residue on 200 sieve 40,000 sq. in. The proportions of sand, cement and water were taken by weight. The water used was chilled rain water.

Experiment.	Mixture by weight. Sand. Cement.			The mixture contains.		Tensile strain lbs. per sq. in			Gauged with p.c. of water.
	Cement	Sand.	Sand not Ground.	Cement.	Sand.	7 days.	28 days	3 mos.	
No 1	1		3	1	3	113	178	255	11
" 2	1	2	2	1	8	164	248	332	9
" 3*	1	3	2	1	11	111	197	280	9
" 4	1	3	3	1	15	84.5	135	182	7
" 5	1	12	2	1	38	35	75	124	8
" 6	1		11	1	11		57	90	4
" 7	1		15	1	15		35	66	3.5

* With reference to this experiment No. 3 it is of interest to note that the countless experiments made with sand cement 1 : 3 : 2 and 1 : 2 : 3 which both contain 11 parts of sand to one cement have proved that they are almost identical in respect of strength. Acordingly the sand cement 1 : 2 when used for mortar with 3 parts sand is superior to Neat cement us d with the same amount of sand.

We use this way of indicating the mixture of a mortar as e. g. 1 : 3 : 2, meaning one part sand cement 1 : 3 with 2 parts coarse sand; as sand cement 1 : 3 contains one part cement + 3 of sand ground together 1 : 3 : 2 mortar will to each part cement have 3 of ground sand and 8 of coarse sand or 11 parts of sand altogether.

This shows the investigation of an eminent English Chemist who has been giving the question of cement considerable study and is associated with the firm known as K. B. & S. English Portland Cement.

There is also a record taken at the School of Practical Science, Toronto, which shows as follows:

School of Practical Science,
Toronto, April 17th, 1897.

Partial record of test of a sample of "Ensign brand" cement.

Neat cement: 2 days in water, 1 day in air:

Briquettes were gauged with 20% of water cement rammed into moulds:
No. 1 = 375
2 = 335
3 = 340
4 = 355
5 = 365 Average = 354

6 days in water, 1 day in air:

Briquettes were gauged with 20% of water rammed into moulds:
No. 1 = 475
2 = 540
3 = 460
4 = 480
5 = 455 Average = 482

Sand test: 1 part cement, 3 parts standard sand; 1 day in air, 6 days in water:

No. 1 = 137 No. 4 = 176
2 = 177 5 = 176
3 = 165 Average = 166

Hot test: Pats of the neat cement placed in hot water for 48 hours (2 days) turned out perfectly sound.

C. H. C. Wright.

DISCUSSION.

Mr. Walker: I would like to ask the cost of that, what the price of it is?

Mr. Butler: I think it is about 10 cents to 15 cents per barrel less than that of Portland cement. The cost of grinding is just in the ratio of 5 to 12, so that the other items are reduced practically to nearly the same proportion. You see adding on the cost of grinding this comes on in the proportion which the cost of sand would bear to cement clinker.

Mr. Walker: The grinding costs less?

Mr. Butler: The grinding costs more, in the ratio of 5 to 12. Sand is worth 60 cents a cubic yard, and cement worth a good many dollars a cubic yard, but the grinding being slightly more expensive it reduces the cost about 10%.

Chairman: What facility does this give for adulterating cement? Does it give a better chance?

Mr. Butler: No.

Mr. Vanbuskirk: What portion of sand is in the cement in Canada?

Mr. Butler: One and one by weight—that is to say the sand cement itself is made up of 100 lbs of Portland cement and 100 lbs. of dried sand.

Mr. Vanbuskirk: I had some sand cement tenders the other day, but I would not accept any because that was not plain.

Mr. Butler: We are putting the cement in such shape that you are getting more use out of what cement is there, and when you realize that every barrel is practically 25% of sand anyway—if you realize that fact, that question does not arise.

Chairman: I suppose the strength consists in this—instead of having the real Portland cement in your sand, you have silica cement in place of that, and the real Portland cement itself is ground to an impalpable powder; that is where the strength comes.

SYSTEMS OF PIPING IN STEAM HEATING.*

By Wm. Mansell.

I have been asked by your Secretary on different occasions if I would write a paper on steam-heating. I will be as explicit and plain as possible in my remarks, and hope they will be understood. They are only a few practical observations that I have gathered during my career as a steam fitter. Being entirely of a practical nature, some of my remarks may possibly clash with the theoretical views of some of your members; and here at the beginning I might say that we find some of the theoretical ideas very impracticable, and also many things which, though practicable, are very unsightly. That being the case, the remark which is often made that anything practical is not unsightly is more true than pleasing.

We in the steam-heating line find we have to keep up with the times in the construction of our work. The advanced and still advancing changes in the construction of buildings has caused an entire revolution in the construction of steam heating plants in the last few years. I don't think I am far astray in saying that in no one of the building trades have the changes been so great or inventions more numerous than those connected with the steam-heating problem. I remember, as a boy at the trade, when the British American Life Assurance Building was under construction, it was the wonder of the day that a 4-inch main steam pipe was being used, and having occasion to go down there one day to get a piece of pipe of that size cut, the workmen were very excited and anxious to know what other big job in the city was using 4-inch pipe.

That building at that time was the pride of the neighborhood, and the job of steam heating was the pride of the city; but step by step the size and height of buildings have increased so that heating engineers have been kept on the hustle right along to keep up with the strides the architects were making to keep pace with the demands of the public and their requirements in the larger cities in the northern part of this continent.

One requirement most necessary to the comfort of the public has been the proper heating of the buildings and the installation of systems most suitable to the construction of the buildings. When you look back, not many years ago, to the time when the open fireplace, with its roaring wood fire, was the only means of warming the dwelling and office; and when the weather got so cold that the mercury got ashamed of being seen and crawled down out of sight; when the folks used to snuggle up to the fire so close that their faces used to almost blister, and their backs felt as though the marrow of their back-bone was turning into an icicle; and then turn to the present and compare the surroundings—how you can sit at the draughting boards in your office, with the weather outside below zero, and the fire perhaps half a block from you, with the temperature in your office at almost summer heat, and all parts of the building the same—give a little credit to the steam-fitter, and don't class him with that much abused individual who is written about thus:

Who is that man, so rightly abused,
Who charges for stuff that is never used,
And when he dies don't get excused?
The Plumber.

Who round my house at night doth sneak,
With my big servant girl to speak,
And tell her "Make the steam pipes leak?
The Plumber.

This man was, perhaps, the same that went to the house to make repairs, and the mistress of the house, seeing him coming, called down to the servant, "Lock the pantry; here comes the plumber." But changes in the mode of heating necessitated changes in the men. A few years ago the same workman used to do the plumbing and the steam fitting as well; but that practice has been done away with, not because the same man cannot do both kinds of work, but because a man must become more proficient if kept working continually on the one class of work, and it has been found that more work and a better class of work was being done at either branch if the same man was kept to plumbing, or to steam fitting, as the case might be, and at the present time it is almost universal to find men being made specialists.

This, perhaps, has helped as much as anything to solve the steam-heating problem. Then it depends a great deal on the place that a workman in the steam fitting trade has been taught his trade—what systems he is best acquainted with—because there is steam fitting and steam fitting, and there are steam fitters and steam fitters, just as there are architects and architects.

In some of our cities the same systems of piping are being employed to-day that were used in the same place and by the same men twenty years age. Here is that system (Fig. 1) and several jobs of this description have lately been remodelled in our city. In this system the steam main would rise from boiler and run up hill all the way to radiators, so that any condensation forming would have to drip back to boiler in the steam main, or be lifted up and forced through the heater, before returning back to boiler, making a great amount of noise throughout the whole building; the sound being conveyed to all parts by means of the lines of piping. The sound would be most noticeable while steam was being raised in the morning, or in case the pressure got down and then got up again quickly.

As a rule, with this system, when the engineer started to get up steam he would shut a valve on the main return entering boiler, and open a valve on a drip pipe which was connected from the return header to the drain. This would blow all of the cold condensation into the sewer and get up a circulation through the system quickly; then when all the radiators were hot he would close the drip valve and turn the condensation into boiler. This old-fashioned system of piping was very faulty, and to better the circulation on some of the radiators that would be stubborn, valves would be placed on each return pipe at the boiler, and a drip pipe with valve would be run from each and carried to drain, and very often the drips from several heaters was discharging into the drain in place of being put back into boiler, necessitating additional water to be turned into the boiler every hour, when steam was up.

A new idea was then conceived, which did away with a lot of noise as well as a lot of pipe. This was to grade the steam main from the point over boiler and run the pipe down hill (Fig. 2), and at the bottom end of all rising steam pipes, and at the end of all long horizontal runs in basement, to insert a relief pipe, drop this pipe down below the water line, and in place of bringing every return pipe back to boiler before dropping down, to drop as direct as possible and connect them in groups, and there connect to main return below water line. The object of running all relief and return pipes down and submerging the junction point is to prevent the steam which has passed through the nearest radiator from rising up the return pipe from some other radiator, which would meet the other current and stop the circulation, or cause bucking. This system of piping is general now in all two-pipe or gravity systems, with the distinction that in place of running separate returns down from all radiators, the returns from radiator on upper floors are connected to the same riser return pipe (Fig. 3). This way of joining the returns with the same riser pipe has given the same results, and works as satisfactorily as running down separate returns, and as it cheapens the cost of work by reducing the amount of pipe and labor, is a grand incentive to its adoption. This system is, I think, the most general, both in Canada and the Eastern States. It has been superseded and has been almost crowded out of existence in the Western States by the circuit main and single pipe riser system, and which has been extensively adopted in this city by some of our architects. (Fig. 4.)

This system of piping has many advantages in its favor in a certain class of buildings over any of those already mentioned. It can be installed in any building having no basement, providing there is room to work below the ground floor joist. Still, it must be understood that the boiler has to be put low enough, to provide the proper distance for steam main above the water line; and again, if there is no space below ground floor joist, the circuit can be carried around on the ground floor near the ceiling, and the branches to ground floor heaters to drop down to them, but as this requires a return main for collecting the dregs from ground floor heaters, it is seldom used.

The circuit system is by far the cheapest to install, as the cost is lessened in several ways: 1st. As you have one main, which acts both as a steam main and also a return. With the main the highest part is directly above the boiler, and from this point it descends with a slight fall until it comes back to the boiler again, when it drops and is connected at bottom. All branches are taken off the top of this main, and rise from that point. This is done for two reasons: First, that all condensation will drop back into main and be carried to boiler, and also to provide for expansion, which is a necessity in all jobs of steam piping, but more especially with this system. The reason of this is that the main is usually carried around about four feet from outside walls, so as to make the horizontal branches as short as possible, which method is found to give the best results.

The rising pipes in this system are, as a rule, from one to two sizes larger in diameter than the two pipe jobs, on account of

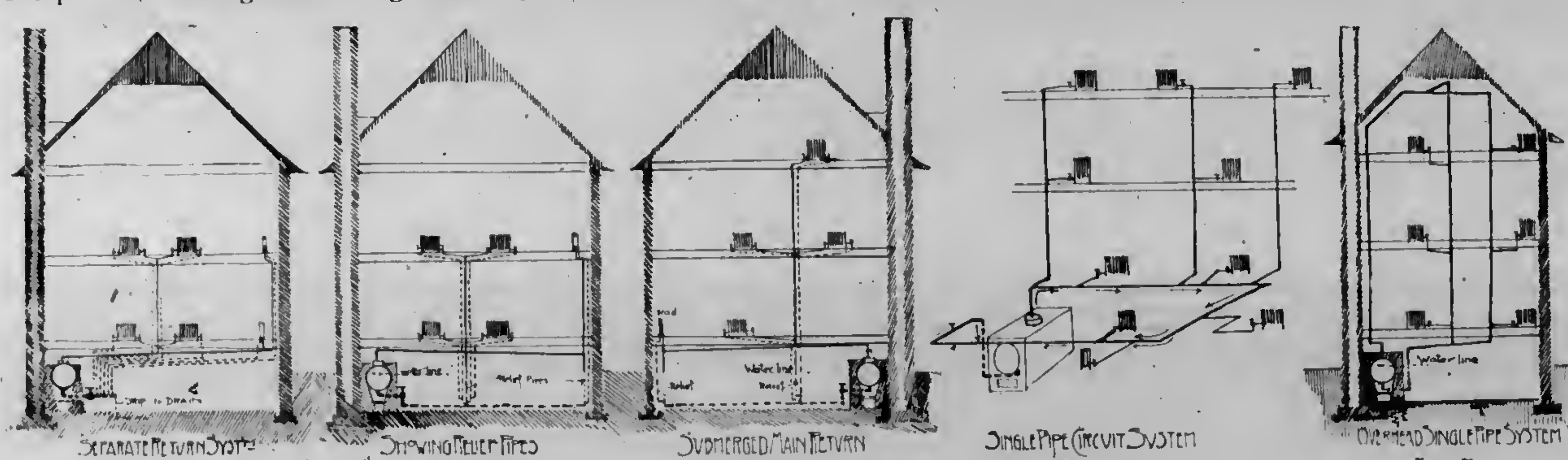
* Paper read before the Toronto Chapter of Architects

having to act the same as the main, both for steam and return pipe. The branches to radiators are also, on that account, made larger, and are exposed either above the floor or below the ceiling, to the connection of radiators. The idea of doing this is a good one, as it prevents the notching of joists and the shrinking of floors necessary in two-pipe work.

Another thing in favor of this one-pipe system is that only one valve is necessary to each radiator. That is a boon to the engineer, as it is the custom with most people who don't understand the difference, when they want to lower the temperature in an office or apartment, to close down one valve on the heater, and if that one happens to be the return valve the heater fills with water and then becomes noisy, or perhaps begins to throw water from the air vent; the same thing will happen if the steam valve is closed and the return valve left open. If the pressure of steam is high enough on the boiler, it will back the water up from the returns and fill the heater, but with the single pipe system the one valve prevents this trouble.

The time saved in installing this system is another item in its favor, and still the greatest saving feature in favor of the circuit system is the temperature at which the condensation is returned back to the boiler, whereby a great saving is made in regenerating steam and in fuel compared with the two-pipe system.

There is still another system of piping which is being extensively used, and which is most favorable to the higher class of buildings, and that is the overhead steam-main system (Fig. 5). The main in this work is, as a rule, taken up to the roof space, sometimes to the ceiling of the floor below the upper one, making the upper floor work the same as from a circuit system, and the rest of building from the drop riser system. The overhead system of piping is very similar in its construction to the circuit, with the exception of its rising steam being carried up first to the highest



Separate Return System — Fig. No. 1. Showing Relief Pipes — Fig. 2. Submerged Main Return — Fig. 3. Single Pipe Circuit System — Fig. 4. Overhead Single Pipe System — Fig. 5.

NOTE. Solid lines of pipe indicate steam pipe; broken lines of pipe indicate return pipe.

point before distributing, and then the circuit is made with the different branches connected to the drop riser. The size of pipes is about the same, but their diameters diminish as they come down in proportion to the number of radiators that are connected. This overhead system has the additional expense attached to it of having a collecting drip return, which gathers the lower ends of all the drop pipes and carries the condensation back to boiler. This is usually suspended from basement ceiling, and when basement heaters are used it is lowered down to suit.

In some of the very high buildings these two systems are amalgamated together, the lower twelve to fifteen floors being worked on the down hill riser system and the twelve to fourteen upper floors worked from a circuit system, sometimes each system having a separate rising main, and in others the one large riser supplying both systems. In either of these systems it is usual to valve all rising pipes, so that any part of system is under independent control. Many of the larger buildings of to-day have their own power plants, either for generating electrical or hydraulic power for elevators and other purposes. Where this is the case the steam for the heating plant is taken from the high pressure boilers and passed through a reducing valve. This valve on one side has the boiler pressure of perhaps one hundred pounds, and this is reduced down with the aid of the reducing valve, which can be regulated or set to give one, two, or as many pounds as may be required in the heating system. The condensation from the heating system is gathered by the collecting drip main, and this is run to a return tank, from which it is drawn and forced back into the boilers with a steam pump. In connection with this system the exhaust steam from the engines and pumps is passed through an invention that extracts the grease from the steam, and the steam is then thrown into the heating system. In some cases this exhaust steam is found sufficient to warm the whole building, except in very cold weather, when a little live steam is passed through the reducing valve.

This, I think, is a fair explanation of the systems of piping used in steam heating. There is another so-called system of steam heating in which the heating is in reality done with hot air. This is called the Plenum or hot blast system. With this you have large heaters constructed with thousands of feet of piping, through which the steam is passed. Either live or exhaust steam can be used. This large heater is housed in with an iron casing, with a large blower fan attached to one end of the housing. This fan draws cold air from outside and forces it through amongst the piping, and at the other side is taken a large sheet metal pipe, sometimes ten feet in diameter, with branches to all parts of building where required, and the air which is heated by being in contact with the steam pipes is discharged all over the building. This system is only practised in certain classes of buildings, such as auditoriums, churches, school buildings and factories. This system is sometimes combined on a small scale with other systems for the purpose of ventilation, and is assisted by extraction fans, which are arranged to draw the foul air out of the building. This system, when used with live steam only, is more expensive on fuel, on account of condensing more steam than in other systems, and having either an engine or electric motor for driving the blower fan.

There is also the system of exhaust steam heating, the piping, which is similar to that in the overhead one-pipe work, but, as the hour is late, I will have to leave that for another occasion, and will now close by thanking you for your kind attention this evening.

TORONTO MASTER PLUMBERS' ASSOCIATION.

At a recent meeting of the above association the following officers were elected: President, James B. Fitzsimons; first vice-president, James H. Wilson; second vice-president, A. S. Bates; secretary, W. G. Ritchie; treasurer, D. Fiddes; sergeant at arms, J. R. Seager. The affairs of the association are reported to be in a flourishing condition, and the meetings are marked by spirit of good fellowship and a purpose to make the organization fulfil a useful purpose in behalf of the trade.

The Sash Balance & Lock Co., of Woodstock, N. B., is seeking incorporation.

The death is reported at Lancaster, Ont., of Mr. John Ross, who is said to have built more miles of railway than any contractor in America. Mr. Ross was 78 years of age.

To the California Architect belongs the responsibility for the following story: An architect and builder who was very proud of his efforts in designing a house which he had just planned and built, met a well known architect in front of the said house. The architect and builder could not resist the impulse to show the architect his creation, and asked him to step in and have a look round and tell him what he thought of his effort. This happened only just lately and the architect had nothing to do that morning so he obliged the architect and builder by viewing the house. "Well, what do you think of it, pretty good, isn't it?" said the A and B, when they had got outside and were looking up at the ig sawed front. "Yes," said the architect, "but it seems to me you have got too many rooms." "How can that be?" replied the A and B, "there is the parlor, kitchen, dining-room and three bedrooms; I can't for the life of me see where any of these could be left out." "How about that large room for improvement?" said the architect, leaving the A and B scratching his head and trying to locate that room.

PLASTERERS' PRICES.

At the last meeting of the Toronto Chapter of Architects, Mr. J. M. Gander, in the absence through illness of Mr. W. J. Hynes, submitted, on behalf of the Master Plasterers' Association, the following as a desirable schedule of charges to govern on extra work:

Metal lathing	35	cts. per yard.
Lathing ordinary	7	"
" 1" lath	8	"
" 5 nails to 4 ft.—add	1	"
One coat mortar on lath	14	"
Two coat work hard white finish	18	"
Three " " " " "	24	"
Gauged work additional	15	"
Dubbing out to be charged where plastering exceeds 1" in thickness.		
Floated stucco sand finish	24	"
Jointing additional.		
Trowelled stucco	35	"
Portland cement plastering ......80 cts. to	$1.00	"
Governed by quantity and quality.		
Keene's cement finish on Portland—		
On brick walls	$1.00	"
On metal lathing	$1.25	"
Lime whiting	4	"
Rendering before strapping	5	"
Pugging 1½" thick	12	"
Moulded cornices one cent per inch in girth but not less than 15 cts. per foot run.		
Material not to exceed 1½" in any place.		
All mitres over 4 in a room each to count as one foot by the girth.		
Angle beads and chamfers, per foot run	15	
Metal angles " " "	15	

Window and door jambs 8" deep and under	10	cts. per yard.
Center flowers, ordinary stock— 24" diameter or under put up, each	$2.00	
Enriched members, not over 2" ordinary stock	10	cts. per foot.
Larger or special centre flowers or enrichments governed by character and selection		
All work modelled to be charged extra.		
Allowance for hoisting charges to be made for all work over 2 storeys in height.		
All work to be measured superficial openings half deducted.		
Plasterers to be charged	35	cts. per hour.
Lathers to be charged	30	"
Laborers to be charged	25	"
All overtime to be charged time and a half.		
Lath per M in yard	$2.50	
" " 100 "	25	
Lath nails per lb	6	
Sand per yard delivered	$1.50	
Barrel or barrow in yard	30	

Mortar—

Per load double team,	$5.00;	delivered	$6.00
" " single "	3.00	"	3.50
" ½ " " "	1.50	"	2.00
" ¼ " " "	75	"	1.25
" brl. or barrow	75		
" hod or keg	20		
" pail, not less	10		
" load shingling mortar		"	3.00
Putty—Per barrel in yard	$2.50;	"	50 cts. extra.
" pail "	25		
Plaster—Per barrel "	2.50	"	50 "
" keg "	75		
" pail "	40		

Patent plasters—per bag with sand	50 cts.
" pail	35 "
Portland cement—Per pail	50 "

TORONTO GUILD OF CIVIC ART.

The Toronto Guild of Civic Art, which aims at fulfilling for Toronto the functions of the Municipal Art Commission of New York, has been introducing itself to the Toronto public by an exhibition of photographic prints of wall decorations kindly lent by the publishers, Messrs. Curtis & Cameron, of Boston.

The subject of mural decoration is at present chiefly before the Guild, as its only official function just now is to represent the city as a supervising body, to work with Mr. G. A. Reid in preparing his design for the decoration of the entrance to the new city hall. It is probable that there will be more work of the same kind for the Guild to do in the near future, for since the introduction of canvas as a ground for wall painting, the art has become so much more feasible that it is rapidly growing, and even commercial buildings have their wall paintings, while a great public building in the United States, such as the Boston public library or the Congressional library, is not considered complete until the walls are painted.

But the functions proposed by the Guild embrace all branches of municipal art. The members are not themselves professed experts, though there is naturally a strong representation in it of the friends and patrons of

STUDY FOR MURAL DECORATION, ENTRANCE HALL, NEW CITY BUILDINGS, TORONTO.—G. A. REID, R.C.A.
From R.C.A. Exhibition.

art, and one-third of the advisory board will always be composed of an equal number of artists and architects. The function of the body is rather to provide a disinterested body of public spirited men who are interested only in seeing that if the city decides to spend money on art, it shall be spent so as to get art. In New York this body is established by law, and all expenditure of money upon art, and all gifts to the city of objects of art, must be approved by the Art Commission. In Toronto the Guild of Art was recognized by the last city council in a resolution to "avail itself of the services of the Guild as occasions arise."

It is desirable that architects should belong to a body of this kind—at least those architects whose interest in art is large enough to induce them to take a hand in a public work at the cost of but little more than their moral support and annual subscription of a dollar for expenses. The occasional meeting with other persons interested in fostering good art will also be a duty of membership, but ought to be counted as a compensating privilege rather than a burden.

The various manufacturers of sanitary ware at St. Johns, Que., have recently combined their interests under the name of the Potters' Manufacturing Association with the object of controlling prices. Mr. Edwin Plant, of Montreal, has been appointed selling agent for the association. Prices have been advanced from 25 to 75 per cent.

KINGSLEY WATER TUBE BOILERS.

THE Kingsley patent water tube boilers, for which Mr. E. A. Wallberg, C. E., of Montreal, has been appointed agent for Canada, are constructed with two shells, an outer and an inner. The outer shell has vertical parallel sides and semi-circular top and bottom. The inner shell is fixed parallel to the sides and bottom of the outer shell by means of two flanged heads and numerous stay bolts, leaving a uniform space about four inches wide between the two shells, extending the full length of the boiler. The crown sheet is horizontal, and extends continually the full length of the boiler. It is flanged down three inches along each side for its entire length, and forms the top of the inner shell by being rivetted to it along each side.

The tubes are threaded at their upper ends with standard pipe threads, and are screwed into the crown sheet. The bottom ends of the tubes are plugged with ¼ inch iron and are then welded solid. The tubes are made of standard 2 inch iron lap-welded pipe. They are short enough in the fire box to leave an ample combustion chamber, and are longer behind the bridge wall. Any tubes can be readily screwed in or out of the crown sheet without touching any other tubes.

The crown sheet is strongly stayed by stay-bolts screwed simultaneously, at various angles, into the semi-cylindrical top of the outer shell and into the crown sheet. These stay-bolts and those connecting the two shells are headed on each end. The parts of the two flanged heads forming the ends of the steam chamber are likewise stayed by rods screwed simultaneously into each, these rods being headed at each end or fitted with nuts.

The water is contained in the tubes and in the space between the shells and extends up a few inches over the crown sheet. As this water service extends unbroken for the full length and width of the boiler, no rapid fluctuations of water level can take place, although the boiler is a very rapid steamer. It is possible to supply any capacity of water or steam space by extending the outer shell upward above the level of the crown sheet to any desired height. It is sometimes desirable to thus increase the steam space where large volumes of steam are required at one time, which occurs in various industries.

Regarding the construction and efficiency of this boiler the manufacturers say: No steam drum is used on these boilers. This is claimed to be an advantage over most water tube boilers, as well as many other types, as a steam drum elevated far above and away from the hottest fire can of itself act only as a condenser, as it is the tendency of steam to cool and condense immediately on leaving the direct action of the fire. In the Kingsley boiler the tubes, being vertical and short, liberate steam very freely, and without friction or impediment, which in all water tube boilers with inclined tubes causes a large percentage of water to be carried up with the steam. This is also one reason why this boiler produces dry steam even under the heaviest forcing.

The feed water, entering at the front of the boiler, between the shells, below the level of the grate-bars, in passing up becomes intensely heated before reaching the crown sheet. It is well known that water, heated to a few degrees above the boiling point, parts with most of its impurities, as mud and carbonates of lime; and at a temperature of about 300 degrees Fahrenheit, equal to 52 lbs. steam pressure, it can no longer retain in solution the sulphates of lime, magnesia, etc., which form the much-dreaded scale in boilers. In this boiler these impurities, being separated by the intense heat, precipitate into the space between the cells, at the bottom of the boiler, where the heat is not sufficient to bake them into scale, and whence they can be washed out occasionally through the hand holes. This boiler is, therefore, by its construction, a perfect feed-water purifier, and no sediment or scale can gather in the drop tubes, because only purified water reaches the crown sheet from which the tubes are supplied.

The boiler, being internally fired, has the fire-box entirely surrounded with a water-jacket. The incandescent gases from the fuel, passing up among the short tubes in the fire-box, are drawn backward among the long tubes to the end of the boiler, whence they divide and return, half on each side, between the outer shell and the brick casing towards the front of the boiler. From this point the now nearly exhausted gases can either be carried by means of a saddle over the front of the boiler direct to the chimney, or they can pass down into a flue under the boiler along to its back end, and thence to the chimney. There is no appreciable difference in economy of evaporation between these two methods of circulation of the gases. The tubes are "staggered" in the crown sheet and are placed at such distances that the gases which pass zig-zag and strike each tube at right angles, while being confined on all four sides by the waterjacketed shell of the boiler, lose nearly all their available heat before they are returned on the sides. For this reason this boiler can be operated also as a locomotive boiler. The gases are passed out of the chimney only sufficiently hot to secure a good draft.

This boiler requires the same size of chimney as any other type of boiler. For hot water heating for buildings there is no change in the construction of the boiler, the steam space being simply filled to the top with water. The fuel economy is the same as for steam purposes. The circulation of the water is the most direct that can be desired, as there is a continual uninterrupted rise from bottom to top of the boiler.

It requires only 6½ feet in height. The brick casing is used only for the return gases, and hence never requires renewing. As there is no fire-brick furnace to renew periodically, the repairs are reduced to an absolute minimum.

It is not necessary to refer to the exceptionally high evaporative economy of this boiler, as this could be readily predicted from its construction. The advertisement of this boiler will be found on another page.

BUILDERS' ACCOUNTS.*

A proper set of accounts to the business man, in whatever line of industry or trade he is engaged, is in effect the chart and compass by which he sails the ship of his business undertakings. It is just as necessary for the builder to know where he stands with respect to resources and liabilities, and in regard to profits and losses, as it is for the merchant. It is just as important for him to know the actual profit in each of the structures he puts up as it is for the merchant to know the profitableness of each of the several departments of his business.

Builders, it has always seemed to me, are especially prone to neglect their accounts. Sometimes this is due to a lack of acquaintance with accounting methods, and sometimes it is due to a willful disregard of what men in other lines of business have learned to profoundly respect. Account keeping, properly considered, is one of the simplest things to which the builder's mind can be directed. Many who neglect their accounts do so from a misapprehension of the requirements of the case. They seem to argue that account keeping is mysterious, and then conclude that they have no time for mysteries, and must necessarily devote themselves to the practical work of their calling in order to accomplish results. If account keeping could be made as simple to them as are the mechanical operations of building, they would undoubtedly give just as much care to the supervision of their accounts as they now give to the mechanical construction of their buildings.

I have been requested by Secretary Sayward to prepare for publication in these columns a short series of articles of a character to help builders in their struggles with account keeping. In responding to his request, I do so with the hope that I shall be able to show builders that the principles of account keeping are no more beyond the comprehension and reach of the busiest builder than are the various mechanical operations with which he is brought into contact day by day. I hope before I am through to point out methods so simple in their application that the builder who prefers to keep all his accounts in a pocket memorandum book may do so and still proceed upon an adequate and scientific plan. At the same time other builders who prefer a complete and detailed set of books, presided over by a salaried bookkeeper, shall also have at their command a system that they will understand, and which shall be in its results in such a condensed form as ever to give them the information that they require for planning their operations.

Before entering upon a discussion of the principles and methods of account keeping for builders, let me direct attention to the difference between what I shall call accounting in these articles and what I would designate as book-keeping. There is far more book-keeping in use in builders' offices and far more of good book-keeping available to the builder than there is of accounting. It is the latter that is particularly lacking. Accounting means the plans and specification, while book-keeping means the mechanical work or the placing of materials in the positions demanded by the plans and specifications.

My effort in the present articles will be along the same lines, to show the builder, and the builder's bookkeeper, where he has one, how to arrange the accounts in a way to show day by day, and more particularly at the completion of every operation, just where he stands financially.

At the first of a year, and particularly in a season when, of necessity, building operations are retarded or are abandoned altogether, it is very natural for the builder to use his leisure to look about him for the purpose of estimating his financial condition. He accomplishes this end by putting into one list all the articles of property which he owns, including cash on hand, materials, equipment, accounts that are owing to him, his interest in incompleted work, etc., at their actual value. In another list he puts down what he is owing—so much to each of several people for supplies furnished that have not been fully paid for, so much to each of several sub-contractors who have not been fully paid for the work that they have done, and including notes outstanding and all accounts with creditors.

However he may make out these two lists, the builder will attempt to do the work correctly, for he will realize that the accounting he is thereby doing is with himself alone and not with anyone else. Accordingly, if any mistake is made in the estimates, either making the amount too much or too little on either side, it will be against himself and by no construction to his own advantage. Therefore he will desire to value things correctly, and neither to over-estimate the amounts that are due him nor to under-estimate the amounts that he is owing to others.

* Abstract of an article by A. O. Kittredge, F.I.A., in The Bulletin.

DESIGN FOR A SUBURBAN COTTAGE.

R. J. EDW[illegible] ARCHITECT.

RESIDENCE OF MR. DAVID KENNEDY, SOUTH PARKDALE, TORONTO.

A. R. DENISON, ARCHITECT.

HALL IN RESIDENCE OF MR. DAVID KENNEDY, SOUTH PARKDALE, TORONTO.

A. R. DENISON, ARCHITECT.

PERSPECTIVE VIEW

Competitive Design for a Central Public School at St. Thomas, Ont.

Simpson & Ellis, Architects.

CANADIAN ARCHITECT AND BUILDER.

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—THE—

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EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery.

The Slate Trade. THE properties of slate and its adaptability to the uses of mankind are said to have been accidentally discovered in warlike times in Wales when the material, so abundant in that country, was used in the construction of earthworks and fortifications. This, of course, was long antecedent to its discovery and use in the United States. Now, however, slate to the value of nearly one million dollars per year is exported from the United States to Great Britain. This trade began in 1876, and strange to say, at that time, Welsh slates were still being exported to New York, Boston and Philadelphia.

Capital and Labor. WE commend to the consideration of the leaders of the labor organizations, the following opinions regarding the rights of capital and labor as expressed by Mr. P. M. Arthur, President of the Brotherhood of Locomotive Engineers: "I differ from many labor leaders as to the methods to be pursued in bringing about the best results. I say organized labor is the hope and salvation of the workingmen. The great stumbling block that has injured us in so many ways is the so-called labor organization which attempts to dictate. It cannot see two sides to any question. We should give and take. The interests of capital and labor, I say, are identical, and the only way these matters can be settled is by a fair honest method—Christianity, I might say. We must do unto others as we would have them do unto us. We must recognize the fact that we are all entitled to certain considerations. What is capital? You work, accumulate money and get into business. Must you be condemned for that? I say no. That is capital. It is only when it becomes tyrannical that we resist it."

Another Building Collapse. THE London City Hall disaster came near being repeated at Owen Sound last month. The floor of the police court was densely packed with persons witnessing the progress of a trial, when suddenly there was heard a loud cracking noise. Following this the floor began to settle, and the frightened crowd made a rush for the doors. The concentrated pressure having been thus relieved, the settlement ceased, and all escaped injury. The floor dropped a distance of two feet at the

rear of the hall, and but for the prompt dispersion of the superincumbent weight, would undoubtedly have fallen to the ground floor, a distance of 14 feet, carrying with it to injury and death a large number of persons. There was a red-hot stove in the room, which must have added to the horror of the catastrophe. The floor is said to have been entirely supported by the outer walls of the building. To avoid the recurrence, in public buildings at least, of accidents of this nature, the municipal authorities would do well to appoint a competent architect to inspect and report upon the safety of such buildings. In order that human lives shall not in the future be sacrificed as the result of improperly constructed buildings, the Ontario government should follow the example of the legislatures of Quebec and Illinois, by enacting that no person shall be permitted to call himself an architect without having passed a qualifying examination to demonstrate that he possesses the requisite knowledge to enable him to adapt the strength of his structures to the purpose for which they are to be used.

A Suggestion. A SUCCESSFUL departure has recently been made by the Cincinnati Chapter of the American Institute of Architects, which might perhaps with advantage be copied by the Toronto Chapter of Architects. When papers are read by members or non-members, invitations are extended to those interested in the subject to be present and participate in the general discussion. Since this has been done the meetings have been very successful. At a recent meeting the discussion was so interesting and instructive that a special session was called to complete it and to give parties concerned time for further preparation.

The Victoria Square Project. IT is subject of sincere regret to all interested in the beauty and healthfulness of the city that the assessment commissioner of Toronto has seen fit to report adversely upon the proposal that the city should acquire the property opposite the new municipal buildings for the purposes of a public square. The commissioner in his report considers the financial aspect of the question at considerable length, and concludes that the city's proportion of the cost would be unwarrantably large. The report recommends that if the Council decide to acquire the property the plan which has thus far been under consideration should be abandoned and the scheme carried out as a local improvement, payments of principal and interest to extend over a period of not more than ten years. It is stated that special legislation would probably be necessary for this object. As to the financial drawbacks of the present scheme, we do not presume to speak with authority, but if it be deemed desirable that the project should be carried out as a local improvement, we see no reason why the payments should not extend over a much longer period than ten years. The improvement would be one of a permanent character, the cost of which should not be entirely borne by the present generation of ratepayers. We are decidedly opposed to the opinion expressed by the commissioner that "the small size of this property precludes it from being of much advantage as a public square." It would have a frontage of 248 feet on Queen and Richmond streets, and a depth of perhaps 200 feet. The cost, which is the chief obstacle in the way of the acquirement of this property, which is almost entirely covered by buildings of trifling value, will certainly stand in the way of the city obtaining a large area for the purpose in the heart of the business district. It therefore comes to this that unless means can be devised for carrying out this project, we may as well become reconciled for all time to the inadequate view of the new municipal buildings at present obtainable and the absence of a spot in the business centre which would afford a resting and breathing place for citizens and visitors.

Canada First. THE false notion which has induced some Canadian institutions to engage the services of foreign in preference to Canadian architects, seems in turn to be displayed by some Canadian architects in the purchase of materials for their buildings. Some of the most important buildings recently erected in Canada are literally full of American materials, counterparts of which we believe might have been purchased from Canadian manufacturers without disadvantage as regards quality or price. We do not advocate the purchase of Canadian materials simply because they are Canadian. On the contrary where a distinct advantage in quality or price lies with the foreign material, it is perfectly justifiable for the architect to purchase abroad. Where the quality and price are about equal, preference should be given to native materials. By giving Canadian materials first consideration Canadian architects can substantially aid the development and prosperity of many important industries engaged in the production of articles used in building construction. If on the other hand they show preference for foreign materials, our manufacturers will be deprived of much trade to which they are entitled and of the incentive to achieve the highest degree of perfection of which their art is capable. Not only so, but our artizans will be deprived of employment. "Canada first" is a motto which should obtain in business as well as in politics.

Effect of Fire-Proofing on Insurance Charges. THE insurance authorities of New York appear to have come to a sudden recognition of the fact that buildings in the construction of which fire-proof materials are wisely employed, are an important factor in lessening fire losses, and should therefore be charged a preferential rate. In pursuance of this idea, the justice of which is self-evident, the companies are eagerly striving to secure risks on this class of buildings, and so keen is the rivalry existing between them that rates have to a large extent been demoralized. It may reasonably be expected that the example set by the insurance authorities of New York will be followed by those of other cities, and will prove a strong incentive to the use of fire-proof construction. In order that the fire loss and the cost of insurance may both be permanently lessened, however, owners, architects, manufacturers of materials and others interested should be careful to see that fire-proofing is properly done. It is not enough that the materials employed be themselves impervious to fire; they will be non-effective unless properly used. The Engineering News has recently published an article and illustrations showing the careless manner in which porous terra cotta has been placed in a so-called fire-proof building now under construction in Park Row, New York City, where, as it states, defects, such as broken skewbacks, broken flange tiles, misplaced keys, etc., are chargeable to the use of injured material, and to the manner of handling the material, rather than to the nature of the arch material itself.

School Accommodation in Toronto. THE result of a recent inspection of the present temporary school accommodation in Toronto, as embodied in a report to the government by the Secretary of the Provincial Board of Health, leaves no room to doubt the necessity for a considerable immediate expenditure on new buildings. The report shows that one-twentieth of the entire school population of the city is unprovided with permanent school accommodation. The temporary accommodation afforded in private houses, churches, stores, basements, play sheds, etc., is necessarily of a very defective character. Of the 30 schools inspected, 18 had less than 16 square feet of floor space per pupil, while in 23 there was less than the required 250 cubic feet of air space. Of the 30 classes inspected 12 were found to have no playground, other than the street. All but two buildings were without artificial ventilation. In no instance was the lighting found to be altogether satisfactory, and in 26 out of 30 class rooms it is described as being either "defective" or very "defective". Not a single room fulfilled what might be considered fairly reasonable requirements. In view of the serious injury to the health of the children which must result from the continuance of the present system, no false notions of economy should be allowed to stand in the way of adequate and proper school accommodation being at once provided. The failure of the Council to supply the necessary funds appears to be entirely inexcusable in face of the fact that the sum of $7,000 per year now paid as rent for the miserable class of accommodation described above would more than pay the interest charges on the necessary new buildings.

THE ONTARIO SOCIETY OF ARTISTS' 26TH ANNUAL EXHIBITION.

THE 26th annual exhibition of the Ontario Society of Artists, which has just opened at the Art Galleries, cannot be said to be like all the rest. There is indeed a marked difference between it and the preceding exhibitions with which we have been acquainted. This may be due to the conditions which have governed the artists, the Royal Canadian Academy having held an exhibition here a little more than a month ago, and necessarily taking a greater portion of the work of the year, or it may be due to the growing desire of the artists to make smaller exhibitions and thus make them more select. However it is, the result is a decided improvement. One misses, perhaps, important canvasses having size enough to accent the walls, which we are pleased to see are hung for the most part in groups, that is, each artist's works together. This is as an exhibition should be, though it may be difficult to do it and preserve symmetry, which is of course desirable.

The quality of the work shown is of a very high average, although nothing comes prominently to the front in point of excellence. Perhaps it is better to have such an average than to have one or more isolated works so overtopping the others that the symmetry is spoiled. If one were wishing a wish within possibility and unconcerned as to whether any one artist came out better than another, caring only for pictures, would it not be that there should be even more uniform excellence so long as the variety was kept? From the point of view of a high average the exhibit certainly must be counted a success.

In a hasty glance at the works around the room, taking them as the numbers run, we should say that the exhibit made by the president, Mr. Reid, is tonal in character. Mr. Challener has only two crisp water colors. Miss Carlyle's "Monday Morning" is a screamer, but is admirable in its directness. A small one is a contrast by quietness. Mr. Grier's two portraits show his knowledge and strength. Mr. Bell-Smith shows only marines, which is perhaps his forte. There are three excellent examples of Mr. Atkinson's work, aad Mr. Knowles has never shown us better landscapes. The quiet grays of twilight attract Mr. Ahrens, and though the one shown is not quite satisfactory, it possesses sterling qualities. Miss Tully's old woman is a very satisfactory picture, not forcible technically, but on that account all the more fittingly treated. Mr. Kelly's water colors are handled with knowledge, and are not ambitious pictures. Mr. O'Brien makes a strong exhibit, and his well-known work always gives one a feeling of satisfaction; it is because there is a fitness of all the parts. The insistence of detail in Miss Spurr's English studies mars the general effect of her work more than usual. A group of roses by Mrs. Reid, a small portrait head by Mr. Sherwood, and Mr. Manly's fairly representative exhibit complete the first room.

In room 2 Mr. Forster's somewhat sentimental "Go Ye" is the first. Sheep by Mr. Kidd is muddy in color, but he redeems himself in the church interior. The tone of Mr. Coleman's water color could be more harmonious. Mr. Martin makes an excellent showing, and the pastel head by Miss Hagarty is one of the successes of the exhibition. Miss Hawley gives us an exhibition of clever handling in her roses, but the small head is more satisfactory. Mr. Gagen's, Mr. Blatchly's and Mr. Rolph's water color exhibits make an even and harmonious wall with Miss Muntz's strong oil head making a central accent. Mr. Staples figure at a window has a good deal of grace, and his attempts at light effects are very creditable. Mr. Matthews' "Weeds" is his best work. The fruit trees by Mr. Cutts remind one of a popular kind of chromo, but are painstaking and deserve some credit. Mr. Verner does not show his best work, and his "Buffaloes in a Blizzard" are too colorless.

Other exhibitors are Messrs. Hahn, Gordon, Revell, Brigden, Bruenech, Jefferies, Cox, Spiers, Hudspeth, Beatty, Miss Douglass, Miss Farncomb, Mrs. Johnston, Miss Martin, Miss Hillyard, Miss Wrinch, Mrs. Holmested, Miss Windeat, and miniatures by Miss Hemming and Miss Drummond.

In room 3 are hung groups of architectural drawings, drawings for illustration and some admirable work by the Saturday Night Composition Club. In the architectural group are drawings by Messrs. Bond & Smith, of a memorial, Mount Royal cemetery; residence, Toronto; houses at Peterboro', for Sir Sanford Fleming; hospital, one story ward system; sketch for church Toronto—by W. A. Langton, of a house in Toronto, store in Berlin, house in Rosedale—by S. A. Heward, of the Vyne, Hampshire; Coutances cathedral, France; Amiens cathedral; Evreux cathedral; half-timbered house, Lisieux, France; old house, Chateauden, France—by E. B. Jarvis, of the McKinnon building, Toronto; and by F. S. Baker, of a proposed addition to British America building, Toronto, and a Competitive Design for Public School Building.

RECENT COMPETITIONS.

In view of the growing disposition on the part of municipal and other public bodies to institute competitions for plans for public buildings, without making adequate provision to decide the merits of the plans submitted, and the appeals recently made by correspondents in these columns to the Ontario Association of Architects, to put forth an effort to improve this condition of affairs, we present the following correspondence and data relating to three of the most recent and important of these competitions :

LONDON HOSPITAL COMPETITION.

In this case the principal point in the conditions, so ar as members of the Ontario Association of Architects were concerned, was that it was promised that the assessor should be appointed by the Council of the Association. The Council were not, however, consulted about the matter, and when, some time alter, the particulars of the competition were published, this condition came to the notice of the Registrar of the Association, and he wrote the following letter :

October 6th, 1897.

P. W. D. Broderick, Esq.,

Sec. Victoria Diamond Jubilee Hospital Co., London, Ont.

Dear Sir,—I have been given a copy of the conditions of competition for the new City Hospital of London, and find in them a clause providing for the appointment of one of the arbitrators by the Council of this Association.

I have not heard from you on the subject, but I think I may say that the Council of the Association would be glad to act in the matter if the conditions of competition do not fall below the standard of fairness to the profession agreed upon by the Association.

There is, however, a point in your conditions which will, I think, make it impossible for the Council to act. In the fourth clause from the end, you say that the successful architect may be compelled to accept for specifications and all necessary working drawings (which would include details) the sum of five hundred dollars, that is to say, less than one-fifth of the regular commission for that proportion of the work on a building costing the sum you propose to spend.

The Association have agreed that the only acceptable condition is, that the author of the design placed first should be appointed to carry out the work at the regular commission, provided that the experts decide that the work may be safely entrusted to him. If the experts should decide that it would not be safe to entrust the work to the author of the design placed first, there would be occasion for the introduction of another architect, and the rules of competition agreed upon by the Association provide that the building committee may insist upon the appointment of some architect, in whom they have confidence, to be associated as consulting architect with the author of the design. But the Association would not agree to the superintendence being otherwise than in the hands of the designer. This is not a question of remuneration only, but is considered an essential of the creditable execution of the design. It is difficult not to injure a design in execution if the superintendence is not in the hands of the designer, even if the superintendent is a designer also and of equal merit—which, under ordinary circumstances, is unlikely.

In view, therefore, of this clause in your conditions, though individual members of the Association are free to accept it if they choose, I think it will be impossible for the Council of the Association to act as your conditions advertise.

I am yours truly,

W. A. Langton, Registrar.

No reply to this was received, nor was there any publication by the Hospital Committee acknowledging any necessity for change in this condition. Subsequently, after the plans were received (having been sent in under the supposition that an assessor would be appointed as promised), the secretary of the committee wrote to the Registrar asking if the Council would act in the matter, to which the Registrar replied, confirming his previous letter. A correspondent, in a position to know, says with reference to this competition : "There was not, when the plans were asked for, any probability of the money necessary to build being even subscribed. The full amount paid for these elaborate plans was $350, divided amongst three of the competitors. As the building can never go on under the auspices of those who got up the competition, even the successful architect has not much for his labor."

The following are the names of those who took part in the competition : Curry & Baker, Toronto ; H. C. McBride, London ; Herbert Matthews, London ; Geo. Craddock, London ; A. R. Denison & Co., Toronto ; Herbert G. Paul, Toronto ; David Ogilvy, Montreal ; J. S. Russell, Stratford ; Strickland, Symonds & Rae, Toronto ; C. H. Acton Bond, Montreal.

ST. THOMAS COMPETITION.

The following are the conditions for this competition:

The City Hall Committee of the city of St. Thomas will receive competitive plans and specifications for the erection of a City Hall under the following conditions :

Plans and specifications to be in the hands of the chairman of the committee (Alderman Sanders) by Thursday April 14, 1898.

The building to be built on the lot on the corner of George and Talbot streets. Size of lot on Talbot street is 124 feet and on George street 110 feet. The lot is on the north side of the street. George street is on the west side of the lot and runs north and south.

The front entrance will be off Talbot street. A side entrance will be off George street to police offices and cells.

1. The size of the building on each floor to be from 6,700 to 7,000 square feet.

2. Plans to show each floor, roof and position of offices and rooms, the location of heating furnaces, pipes, radiators, lavatories, etc.

3. Heating to be by hot water.

4. Elevations to be given of each side of the building.

5. The specifications are to provide for a building complete, including heating, wiring for electric lighting, pipes for gas and plumbing. The whole cost not to exceed $32,000.

6. The basement to be under the whole building, to contain 10 police cells, room for lodging tramps, room for policemen, spare vault room, coal and furnace room and to have at least 10 foot ceiling.

7. First and second floors to contain the following offices and rooms :

City Treasurer.—Office for public about 500 sq. ft. ; private office about 160 sq. ft. ; vault room about 50 sq. ft.

City Clerk.—Office for public about 400 sq. ft. ; private office about 160 sq. ft. ; vault room about 100 sq. ft. (vault room in clerk's office may be reduced by having another vault on the same floor if found more convenient.)

City Engineer.—Office for public about 250 sq. ft. ; private office about 160 sq. ft. ; vault room about 40 sq. ft.

Tax Collector.—Office for public about 400 sq. ft.

Assessor and Sanitary Inspector.—Office for public about 400 sq. ft.

Police court about 600 sq. ft.

Police magistrate's office about 200 sq. ft.

Chief of Police.—Office for public about 200 sq. ft. ; private office about 160 sq. ft.

Free Library.—Public room about 1,600 sq. ft., and two rooms of about 150 sq. ft. each.

Committee room, adjoining or near City Engineer's office, about 500 sq. ft.

Mayor's office about 200 sq. ft.

Two spare offices each about 200 sq. ft.

Auditorium to have seating capacity for about 450 people or may have gallery to seat about 100 and floor space to seat about 350.

Attic to be used as an art room.

To be lavatories in basement and on first floor and second floor with wash bowl in each office.

The specifications are to be full and complete for each trade sufficient for a proper estimate to be made of the building.

The committee offers for the first design and specification selected the sum of $150 and for the second the sum of $75.

The committee reserves the right to have the probable cost of the building certified to by a builder appointed by them before deciding on the merits of the plans.

Every architect submitting plans must agree in case his plans are accepted by the council to furnish at the request of the council full plans and specifications and detail drawings necessary to enable the contractor to erect and complete the building, which are to become the property of the council on their paying the architect two per cent. of the $32,000, less whatever sum he may be awarded by the council as a prize for his plan, and every architect submitting plans shall be considered as submitting the same subject to this condition, and in case of his failure to furnish such plans, specifications and detail drawings within one month from demand made by council he shall forfeit any prize to which he may have become entitled for his plan.

March 18th, 1898.

Richard Sanders, Esq.,

Chairman City Hall Committee, St. Thomas, Ont.

Dear Sir,—I am instructed by the Council of the Ontario Association of Architects to send you the enclosed Conditions of Competition which have been adopted by the Association as a standard of fair conditions, and to respectfully advise you that the conditions of competition for the St. Thomas new City Hall, which have recently been received, are not such as to induce the best class of architects to enter the competition.

The requirement of complete specifications for each trade implies also drawings so complete that the time from March 14th, when the conditions were received, to April 14th, when the drawings must be sent in, is not sufficient to allow for making the work required to be bona fide as intended by your committee.

There is no provision made for judgment of the plans by a person of professional training and experience, and without such provision there is no certainty that the best plan will be known to be the best.

There is no provision made for secrecy as to the authorship of the plans, without which, even with the best intentions on the part of the promoters, there is no guarantee of a perfectly unbiased judgment of the merits of the plans.

The commission offered is not sufficient to make it worth while for an architect in good practice to do the work, even apart from the risks of a competition.

The Council of the Association will be glad to give you any assistance necessary to make a competition which will be acceptable to the better portion of the profession, and have instructed me to offer you their services and assure you that the interests of the public and that of the profession are one in a matter of this kind.

Public buildings ought to be convenient and attractive, but they can only be made so by putting their design into the hands of a good man. The same mass of materials becomes either a good building or a poor one according to the skill of the architect who plans it. For this reason, good work is worth its price. But more than this, want of skill always means waste of money, and to make your competition an inferior competition, involving the choice of an inferior architect, means not only a loss in the quality of the building erected, but an actual outlay which the saving effected by reducing the commission paid is not likely to cover. So that you are likely in the end to spend more money rather than less, to have certainly more trouble and, for it all, a worse building.

I remain, yours truly,

W. A. Langton, Registrar.

March 19th, 1898.

W. A. Langton, Esq.,

Registrar O. A. A., Toronto, Ont.

Dear Sir,—In answer to your favor of March 18th, re competition of city hall plans I beg to say that when the committee prepared the information to send to architects they did not know that your Association had any standard conditions of competition. I they had known that such was the case it is likely that they would have taken them into their serious consideration, but as a certain amount of the time has now elapsed, and as you say it is too short anyway, I do not see that anything can now be done to improve the matter.

There have been a large number of applications for the conditions, and as yet only two architects have raised any objections. As to the question of judgment of the plans that may be considered later on by the committee, and probably the advice of your Association may be asked for.

Yours truly,

Richard Sanders, Chairman of Committee.

March 22nd, 1898.

Richard Sanders, Esq.,

Chairman New City Hall Committee, St. Thomas, Ont.

Dear Sir,—In reply to your letter of March 19th, I regret that you find yourself unable to amend your conditions of competition.

It will give me pleasure to report to the Council of the Association the good will shown in your letter and the suggestion that you may wish to ask their advice when it comes to the judgment of the plans, but regret that I can only inform you that it will be impossible for the Council to take part in the affairs of a competition which is not acceptable according to the standard fixed by the Association.

Yours truly,

W. A. Langton, Registrar.

The names of the following architects have recently been published in the daily press, as having submitted drawings in the competition : N. R. Darrach, two sets; J. Z. Long & Son, three sets ; E. T. MacDonald, New York ; A. W. Rush & Son, Grand Rapids, Mich.; Wilkinson & Stewart, Montreal ; Radins, Garrett & Cellar, Detroit ; Harry J. Powell, Stratford ; Thos. Kennedy & Son, Barrie ; Robt. Thom Brooks, Detroit ; Geo. R. Harper, Toronto ; Geo. Craddock, London.

It is announced that the council have accepted the plan submitted by Mr. Darrach, and that the second prize has been awarded to Messrs. J. Z. Long & Son.

STRATFORD COMPETITION.

The conditions drawn up by a joint committee, called the Market and Police Citizens' Committee, consist in the first place of a specification of space to be occupied, cost, accommodation and material. Then follow these conditions under a separate heading called "Terms of Competition."

Two sets of plans will be selected, one for the restoration of the old building and one for the erection of a new building.

If the architect furnishing such a plan and the Market Committee can agree upon the terms upon which the architect's work is to be done, he will be engaged to furnish along with such plans the necessary specifications and such details as will enable the different classes of tradesmen intelligently to tender for the work to be done.

In the event of failing to agree upon terms, the committee may discard for that reason the plan selected and take the one next most suitable or advertise for another.

Upon agreement between the committee and any such competitor, the plans and specifications aforesaid will be supplied and tenders got for the work, and plans with tenders be submitted to the ratepayers for their choice between the plan for restoration and that for new building at the time of voting for the by-law authorizing the issue of debentures for building or restoration.

If either plan is adopted by the ratepayers, the architect whose plan is so adopted will be retained as architect for the furnishing of further plans and detail drawings and superintendence of the work upon the terms agreed upon as aforesaid.

In such event, the architect whose plans have been so selected but rejected by the ratepayers will receive the sum of $200. In the event of both plans being rejected by the ratepayers by the defeat of the by-law, the sum of $300 will be equally divided between the architect whose plans have been submitted for the approval of the ratepayers aforesaid. (There is evidently here a typewriter's error.)

The following is the correspondence between the Registrar of the Ontario Association of Architects and the chairman of the Market and Police Committee :

May 5th, 1898.

George F. Ingram, Esq.,

Chairman Market and Police Committee, Stratford, Ont.

Dear Sir,—I have been requested by a member of the Association to send you the enclosed Conditions of Competition, which have been adopted by this Association as a standard of such conditions, and to request that you read them with a view of amending, if it is not too late, your conditions of competition, so that in essentials they may not fall below this standard.

I trust you may not consider my intervention an impertinence, as I have no doubt you desire to make a competition which will secure a good design for your building, and in writing to you I represent a number of architects of the best standing, who would be glad to contribute plans if the competition can be made such as to ensure the selection of the best plan and fair treatment of the architect.

The conditions I enclose were drawn up so as to cover the most important competitions, and there are a number of clauses devoted to making a fair judgment easy by enforcing uniformity in the

manner of making the drawings. This part of the conditions, which might in any case be modified according to the size of the building proposed, would in this case have to be dispensed with altogether, as some competitors may already have drawings under way.

The two conditions to which I wish to direct your attention, and which I think are essential if the best men are to be induced to take part in the competition, are that which requires expert judgment of the plans and that which provides for fair payment of the successful competitor.

If I understand correctly the article entitled "Terms of Competition" in your conditions, the plans in this competition are to be judged by your committee. I do not know who else compose your committee, and know yourself only by name, so that I am sure you will accuse me of no disrespect in suggesting that there is no assurance in this arrangement that the best plan will be known to be the best.

I suppose I may assume that your committee is composed of practical business men, and as such, you are probably pretty well posted in the law as it applies to your affairs, far more so than you are with either the practice or the art of architecture; yet you would not think of taking any new and important step in business without consulting a solicitor about any legal question involved. Here, however, is an important step of another kind in which the same need is not recognized. Yet I think the position of the average business man with regard to judging the merits of a plan is fairly represented by a client of mine—a successful man of affairs who had also had previous experience in building—who, in employing me, showed me a plan which he had had made some time before, intending to build from it. "When I saw this" he said "I thought this is just the very thing we want, but after looking over it all winter I have come to the conclusion that it is not what we want at all."

In a competition of this kind, there is no time for the judges to supplement want of experience by long continued study and the only way to ensure that the best plan will be known to be the best is to employ an expert to judge the plans.

I am, of course, speaking from the point of view of the architect, who, before spending time and money in producing a good plan, wants some assurance that his plan will be known to be a good plan; but of course the interest of architects and of the municipality are one in this respect. You also want to have the best plan recognized and built and not to be in the position of finding out for the first time after the building is up that it is neither attractive nor convenient.

With reference to the second point of which I spoke, as essential to a competition acceptable to the best members of the profession, I do not think you will find any good architect willing to make plans first and afterwards debate with a committee what his fee is to be, with the understanding that the amount he will consent to take as commission is to be made a factor in the judgment of his plans.

I am sure it is unnecessary to point out to you that it is not good policy to cut down the remuneration for services below the point that a reputable architect will accept. The difference between the recognized commission and a reduced commission is a very small saving in an undertaking of this kind, but, if it keeps the better class of practitioners out of your competition it may be a source of serious expense, not only in the process of building, but afterwards in the form of an annual drain for running expenses, which would soon mount up to many times the saving in the architect's fee.

Yours truly,
W. A. Langton, Reg. O.A.A.
Stratford, May 9th, 1898.

W. A. Langton, Esq., Toronto.

Dear Sir,—The City Hall Building Committee have considered your letter of the 5th inst., and do not feel free to make any changes in the conditions already agreed upon. We have already received from Toronto and other places applications for particulars, and are persuaded that there will be a large number of plans and specifications from reputable and experienced architects.

Yours, &c.,
G. F. Ingram, Chairman M. & P. Com.

The Chairman of the Committee seems to be under the impression that every applicant for particulars relative to the competition will be a contributor of plans, but it remains to be seen what "reputable and experienced architects" will take part in the competition.

A REJOINDER.

To the Editor of the Canadian Architect and Builder:

Sir,—Mr. Langton's very tolerant letter states clearly his grounds for faith in the O. A. A. and its programme. Mr. Langton believes (first) that the public can be best protected from building accidents by making compulsory a higher education for architects, and (second) that this higher education can be best secured by an enactment conferring on the Association powers of examination and proscription.

Still Mr. Langton admits the importance of municipal supervision and inspection of buildings, but considers this the "small end of the affair." Mr. Langton considers that in view of the fact that in 1895 the Building By-law Committee of the Association made certain recommendations to city and town councils in Ontario, the Association has done its duty in this direction, but Mr. Langton nevertheless thinks that good might come of my writing to the daily papers.

Mr. Langton, The Canadian Architect and Builder, and every one who has considered the matter, agree with me that the building accidents that have occurred in various parts of Ontario are but signs of the general insecurity that results from methods of building that are now permitted.

Granting for the sake of argument that all the advantages that can be claimed by the most ardent backer of the Association's programme would follow its sanction by law, this "higher education" of the architect, which Mr. Langton feels sure the proposed legislation would foster, could come—if it came at all—only after years of organized work.

Now, I submit that those dangers of which I have spoken, and the existence of which we all admit, demand the immediate application of rigid measures of inspection and regulation, measures that shall be prompt and positive in their action. To find precedent for this sort of legal restriction it is not necessary to go to Illinois or Quebec. Such control of building operations is sanctioned by almost universal custom. Cities far larger than any Canada can boast have long had their building departments, not all of which can be accounted failures. Toronto should have a Building Department worthy of the name. As Mr. Langton very truly says, this is the small end of the affair. It is the handle end.

According to Mr. Langton the "elevation of the profession of architecture" is the large end. "Elevation of the profession" is a somewhat vague term, but with it, in Mr. Langton's mind, the idea of an association that has power to bind and loose seems to be closely associated. Against the view that the carrying out of the Association's programme must make for better architectural design, there is, I think, much to be said.

Many of the younger men now practising architecture in Ontario have had their best training in England or the United States. It is significant that amongst them the Association finds few supporters. To what is this to be attributed? The reasons are no doubt various.

The Association believes that the profession is to be raised by an act of Parliament, or by use of the privileges to be conferred by that act. Some of the younger men have seen architecture practiced on a high plane without legal bolstering. The Association stands for the old-fashioned apprenticeship idea; some of the younger men have seen in its place a more enlightened system. The Association has been seeking government authorization for its examinations, and this authorization being withheld, it has been threatening their abandonment; some of the younger men have profited by the examinations of an architectural body that asks no government favors. The Association professes to believe that the safety of the public can be secured only by applying tests to the architect and placing those found wanting under certain disabilities; some of the younger men have seen the building operations of a metropolis regulated successfully by means of the inspection and revision of plans and specifications, and the public supervision of buildings. The Association stands for "protection"—protection to native talent—protection of the public against the awful corrupting art of the United States architect; some of the younger men believe that Canadians can care for themselves in the talent market of the world. Or, if they can't, then so much the worse for them! And some one or two of the younger men may even be heretical enough to think that a Toronto Board of Trade building here or there in Canada will not prove a very positive injury to public taste, or a very ill example to the Canadian student. In short, some of the younger men believe that competition is not without its use in the "elevation of the profession," if in that phrase is included the idea of the betterment of architectural design. Finally some of the younger men feel that such legislation as the Association has been seeking cannot be justified on any broad economic principles; that it breathes the spirit of the trade guilds of more than a century ago, and that the time for that sort of thing is gone by.

Much respect as the personal qualities of many of the influential members of the O. A. A. must command, I question if the young men in the profession can work up much enthusiasm for what seems to them like "old-fogeyism" in the Association's programme.

Yours truly, Arthur E. Wells.

COMPETITION FOR PLANS FOR ARTIZANS' DWELLINGS.

The attention of Canadian architects is directed to the notice appearing in our advertisement pages of a competition for plans for artizans' dwellings, by the Massachusetts Mechanics' Association, Boston. A single prize of $500 is offered for the plan which shall best meet the requirements. We regret that at the time of going to press the conditions and other details of the competition had not reached us. We are therefore unable to do more than call attention to the advertisement.

BY THE WAY.

Dr. Manning had a strong sense of humor, and delighted in telling Irish stories, says the Westminster Gazette. One related to an Irish laborer, who was thus addressed by a passing Englishman: "What's that you're building, Paddy?" "Shure an it's a church, yer honner." "Is it a Protestant church?" "No, yer honner." "A Catholic church, then?" "Indade an' it is that same, yer honner." "I'm very sorry to hear it, Pat." "So's the divil, yer honner."

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The legal mind has been taught to depend largely on precedents in deciding upon any given course of action. This legal characteristic found its way into the practice of a Winnipeg architect recently. The architect had designed a house for a lawyer and was submitting the same for approval, when his client made objection to the manner in which the roof was curved on a corner tower. He pointed out that there wasn't another house in town with a similar roof, and without such a precedent he would not approve of this feature of the design. In deference to his wishes the architect was obliged to forego a feature on which he had felt disposed to pride himself, as being a departure from old and commonplace methods.

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Architects and householders in Hong Kong have two betes noir, viz., typhoons and white ants. To guard against the first of these many special forms of construction have to be resorted to, especially as regards roofs, the scantlings of the timbers employed being very heavy, and the covering, consisting of curved plain tiles with tile and mortar ridges, being laid double with a space between the layers. What are known as white ants constitute a most persistent scourge, and from their habit of eating away at the centre of a baulk of timber without revealing their presence on the surface, are a source of continual danger where wood beams are employed for constructional purposes.

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A British Columbia correspondent requests me to sound a warning for the benefit of persons in Eastern Canada who may have gained the impression that employment at good wages is plentiful in that province. He says "We have a great many unemployed, as hundreds are flocking in here from all parts of the world, and this (Vancouver) being only a small town they soon fill up any vacancies. We are trying to raise our wages from 25 to 30 cents per hour, but I fear it is impossible, as we can get all the men we want at 25 cents. This morning before 9 o'clock we had 7 men asking for work, and when the boats get finished in about a month we shall have 300 more thrown on the market. There are several big jobs spoken of, but the owners are rather backward on account of the rise in lumber and the proposed rise in wages."

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Among the odd trade advertisements displayed at the recent Stockholm exhibition, the Lilietolmens candle played a prominent part. The lower part, which was intended to represent an old Swedish candlestick, was in reality an enormous structure of bricks and mortar, in which was established a perfectly equipped candle factory, where employees worked six hours a day. The base of the candle-stick covered a space 40 feet square. The candle-stick itself was 47 feet high, while the candle—a real stearine specimen was fully 80 feet; its diameter was 8½ feet. The appearance of this extraordinary trade trophy was at once remarkable and imposing. The colossal candle stick was painted with an aluminum powder until it shone like well polished silver. At night too, an electric searchlight of 7,000 candle power cast its beams from the lofty summit of the wick over the whole of the exhibition grounds. The cost of the structure was about $10,000.

UNSAFE BUILDING CONSTRUCTION.

A correspondent writing to the Architect and Builder from British Columbia anent the recent building disaster at London, Ont., alleges the existence of an unsatisfactory condition of affairs in the city of Vancouver. He states "The Board of Works, composed of one alderman from each of the five wards, has not had a practical man upon it since Alderman Franklin quit in 1894, and plans of buildings submitted to the board are passed at once with the formulae, 'subject to the approval of the the city engineer,' the consequence of which has been failure after failure. The Metropolitan Club building (corner Hastings and Homer streets), erected four or five years ago, has been recently repaired at a cost of over $6,000. In this case two stories and gable 50 feet wide, of brick work, were carried on three brick piers and four wooden posts 5½ inches face and 16 to 18 inches deep. The posts were from 25 to 27 feet high on the Hastings street front, taking in both ground and entresol floors, above which the brickwork begins, carried on wooden bressummers. As a matter of course, and in a very short time the bressummers began to sag and the posts to buckle. The architect then discovered that times were becoming dull in Vancouver and left for Australia, and Mr. Parr (now Parr & Fee, architects) was called in just in time to prevent a general collapse and the whole Hastings and part of the Homer street front from falling right into the street. Mr. Parr enclosed the wooden posts with cast iron on three sides, substituted rolled steel beams for the wooden bressummers, strapped and bolted the brick work together, etc., etc.

Another nearly similar case is that of the Inns-of-Court building (corner of Hastings and Hamilton streets) by the same architect, now at the antipodes. In this instance the same construction has been followed, only, the roof being a flat one, there is no gable, and consequently less weight to be borne by the woodwork, so that it will stand out a while longer. The projecting octagonal tower on the north-east corner, however, had to be shored up, while the stone corbels were being strapped and bolted back and the brickwork of the tower itself tied back with a steel wire rope. After this had been satisfactorily accomplished the shoring was removed, and a moulded and soldered covering of zinc painted to represent stone now conceals the real corbels below, with the straps, etc., etc.

A very nice question, it appears to me, would be, how far the city which passes these plans could be held liable for damage done in case of failure. It is certain that the way in which Vancouver has hitherto escaped is little short of miraculous, all things considered—only it may not continue so—and if 'the safety of the people' be 'the highest law,' surely the man who does something to secure that end is deserving of some commendation. I might add a great deal more on a matter of so great importance, but think I have said enough for the present."

NOTE ON THE OBJECTS OF THE TORONTO GUILD OF CIVIC ART AND ON THE EXHIBITION OF PRINTS OF MURAL PAINTINGS.

By Prof. Mavor.

The Toronto Guild of Civic Art has been founded upon the model of similar associations in New York and elsewhere. Its two chief purposes are, first, to promote and encourage the production of works of art intended for the embelishment of the city or for its public buildings ; and, second, to provide an organization for a discriminating selection of these.

Encouragement of art has come to assume considerable promi-

Mr. B. E. Walker,
President Toronto Guild of Civic Art.

nence among the functions of the modern municipality. Few cities, indeed, are without a memorial of some important figure or event in national or civic history which is also intended to be an object of interest from the point of view of art. The selection of these memorials has, however, not always been happy, and thus they are often lacking in artistic interest. No doubt the most impartial and expert of experts may make a blunder, but the impartial expert has had, as a rule, little to do with the selection of designs for public memorials in the modern city, whether in Europe or America.

Yet, especially during the past few years, publictaste has been greatly educated. This has been accomplished in the first place by the increased number of persons who have received in some degree artistic training, and in the second placeby the extension of appreciation produced by the knowledge of artistic movements to be derived from magazines and from exhibitions of pictures. This extension of appreciation is also, nodoubt, aided by travel, although in art as otherwise the extent of atraveller's excursions depends upon the extent of his resources.

The effect of all this upon the selection of public monuments has not been fully felt because, with respectful acknowledgment of his many valuable qualities, the civic ruler is not in general elected on account of his capacity to estimate the relative merits of designs in painting, sculpture or the like, but on other grounds, and thus the selection of designs has been done everywhere, more or less, by haphazard. Even Paris is studded with gigantic and costly blunders, the result of unintelligent and misdirected national and municipal encouragement of art.

The Guild of Civic Art, while not arrogating to itself the position of a Court of Art, does attempt to provide the machinery by means of which, as occasion arises, a consultative committee might be formed which would aid the public authorities in arriving at a decision upon designs which may be submitted to them. The Guild also may be able from time to time to suggest the adoption of measures for the beautification of the city or of its buildings.

Thus, under as competent guidance as in each case it may be found possible to procure, the Guild might expect to be led to choose those designs which might most appropriately and worthily be carried out for the enrichment of the city, and thus be enabled to render an important service to the civic authorities and to the citizens. Such service can be effectively rendered by the Guild only if it is strongly supported by public opinion and by public confidence. Its membership is open to all who have an interest in art and who are anxious to extend and to render more intelligent the knowledge of it. While the membership is thus open, the Executive Committee of the Guild is composed partly of artists and partly of laymen.

Among the methods of embellishing public buildings by way, on the one hand, of expressing public magnificence, and on the other of stimulating the appreciation of art, mural painting has, during the past few years, taken perhaps the most prominent place. In Paris, the government, the university, the municipality and other public authorities have recently given to the Pantheon, to the New Sorbonne, and to other public buildings, mural paintings which have been epoch making in the history of art. The elementary schools in Paris have even been enriched with works of the same kind. In Edinburgh for some years a similar movement has been going on, by means of which, for example, University Hall and St. Mary's Song School have been endowed with notable decorations by Scottish artists. More recently the fashion has crossed the Atlantic, and the Public Library at Boston, the Congressional Library at Washington, the Walker Art Building at Bowdoin College, the Astoria, Manhattan and Plaza Hotels in New York, as well as several banks and private houses, have been decorated with mural paintings by French and American artists.

The exhibition of the Copley Prints now beingheld in the rooms of the Ontario Society of Artists, has been promoted with the object of indicating how other cities have encouraged art by acquiring for their public places great mural decorations which may afford their citizens free enjoyment for some generations to come. The exhibition also discloses how the intelligently directed efforts of a few public bodies in the United States have called into existence a school of decorative painting, and have given at once opportunity and fame to a number of artists whose works must otherwisehave been seen by the public only at infrequent intervals in exhibitions.

A most conspicuous advantage possessed by mural painting is to be found in the necessary condition of the work. If it is not actually produced in the place which it is to occupy, as is the case with fresco, it must at least be produced for the place. The decoration to be successful must meet the conditions of lighting, etc., which the position of it affords. It ought, therefore, always to be seen to advantage, unlike a picture which, tossed about from one wall to another, or from one gallery to another, probably is never seen in the position which the artist intended it should occupy.

This condition of placing leads to the observation that mural painting is not to be looked upon as a mere embellishment of a

Mr. W. A. Langton,
Secretary Toronto Guild of Civic Art.

building ; but ought rather to be regarded as an integral part of it, designed as a portion of its architectural detail and as necessary as any other portion to make the building a unity. This, of course, is another way of saying that art is not a mere addition to life, but a part of it, and that the intelligent cultivation of it is as necessary as the intelligent cultivation of any other function of individual or social well-being.

A nation or a city loses much in possible vitality which does not cherish its artists and encourage them by discriminating appreciation and appropriate opportunity.

A specific lesson may, perhaps, be drawn from a chapter of civic history elsewhere. About ten years ago, the city of Glasgow built a municipal palace by the side of which our own civic build-

ings might go not unworthily. The designs of that building included suites of rooms elaborately panelled in rare woods, alabaster staircases and other costly items upon which the workmanship was the least, while the material was the greatest part of the cost. These rarities were brought from the ends of the earth at great expense and for no other reason than that they were expensive, for they certainly were not beautiful. Ten years ago also a small band of artists were struggling in Glasgow against public neglect. Had the civic authorities had intelligence and foresight enough they could have had the town hall filled with mural paintings at a cost trifling compared with their alabaster staircases, by artists whose works are now as eagerly bought at St. Louis as at Munich, and who have made the name of the Glasgow School famous all over the world. Had they done so they would have compelled lovers of art to make pilgrimages to Glasgow to see the mural paintings as they do to the town halls of Germany, Italy and Belgium.

The opportunity which Glasgow failed to embrace is actually now at hand for Toronto. There is a civic building, and there are the artists, many of whom no whit less competent, though at present less known, than those of the Glasgow School.

THE EXHIBITION OF COPLEY PRINTS.

On the occasion of the opening to the public of the exhibition of Copley Prints in the Art Society rooms on April 16th, the president, Mr. B. E. Walker, gave a further explanation of the aims of the Guild of Civic Art, in the following admirable address :

The Advisory Board have thought it well that I should at this time say a few words as to the objects of the Toronto Guild of Civic Art. Its constitution states that it will "act as a purely supervising, consulting and advisory body to promote and encourage civic art, including mural painting and decoration, sculptures, fountains and other structures or works of art or of an artistic character ; and to arrange for the execution of works of art by competent artists, to be chosen by competition or otherwise, and to hold exhibitions from time to time of works of art more especially connected with mural decoration, architectural and stained glass designs, sculpture and kindred subjects." The members of the guild believe that the time has come in the history of Toronto when the services of such a body are required, but the guild can effect little or nothing unless it is encouraged and supported by an intelligent and active public opinion in favor of its purposes. The city of Toronto is rapidly emerging from the initial stages in its development when little in the way of architectural beauty or of taste for art was to be expected. The improvement in the character of the exhibitions of the works of our artists, the numerous societies of painters, decorators and architects now established here, the improved taste of our people in the selection of pictures and works of art for their homes are all evidence that whether we have cause to be satisfied with our progress or not we are none the less progressing. The change is quite as noticeable when we turn to the art of the street and square so far as external architecture is concerned, but whatever may be said of the interiors of our residences little surely can be said in praise of the interiors of our public buildings.

We have culminated an extraordinary era of building in Toronto by the erection of two great buildings destined to remain most prominent landmarks for perhaps centuries and each costing between one and two millions of dollars—the Parliament Building and the City Hall. They are both, architecurally, important specimens of a revival in art, which is, at all events, partially Byzantine in the external decoration, but the one building which is finished internally is conspicuously marred to the eye by its bare white walls. If the scheme of art suggested by the exteriors is to be carried out the walls of the interiors should be gradually covered with mural paintings commemorating the history and the arts of our country and illustrating also our intelligence and skill in mere decoration. If this were done, perhaps in some far-off century the students of the present Byzantine revival may find our interiors as interesting as when in old Ravenna to-day in the interior of buildings nearly ruined externally by time he finds as fresh and rich in color almost as when executed the splendid Byzantine mural decorations in mosaics of the sixth century. We would not, however, have you think that we are indulging in dreams of large expenditures for art or the rapid fulfilment of any such ideal. Our ideas of what it is possible to accomplish are very modest indeed. But we do wish to excite public opinion to the extent of desiring that the first modest steps shall be taken in these two great public buildings to show that we are people of taste, that we care for our history, that we are at least aware that a splendid revival has come in many if not all of the great nations of the world, in that ancient, almost the most ancient of all arts, mural decoration. If a few panels are executed yearly the cost will be trifling, very trifling, and two great purposes will be served. First, these public structures will be adequately ornamented. Second, our artists will have the opportunity to exhibit their skill adequately. It is in wall painting that the greatest work of many great artists has been done. It does not matter whether it be Perugino or Rafael, Signorelli or Michelangelo, Ford Madox Brown or Leighton, Puvis de Chavannes, Hunt, Sargent or any of those who are reviving wall painting, it is upon some great wall space that they have shown the breadth and perfection of their art, and not where the scope of the easel has constrained them.

Turning to other fields of art, if we have extensive parks we are certain to have works of sculpture. I am sure we have all wished at times that the earth might open and swallow up the specimens of sculpture which sadden the hearts of men in so many cities, and should we not hope to escape from a similar fate? And in more practical matters, such as the proportions of a city square, the design of a fountain or bridge, there is room for beauty or the reverse. We are a prudent people and I wish to point out emphatically that the main purpose of this guild, rightly understood, is economy. Public or private money will be spent to decorate the interior of the buildings referred to and to erect statues, fountains, bridges, etc. The real question is, do we wish to get the maximum of beauty for the money we spend or not? The object of the guild is to provide a means of obtaining as nearly the maximum as possible. Over and over again in public expenditure the same money which might have purchased beauty and lasting pleasure has purchased the reverse. When the authorities of a city build a water or a drainage system or undertake the making and paving of a road they employ engineers and other experts to superintend the work. They do not imagine that members of the Council are able to direct such matters without the aid of expert knowledge. Is there not even more reason for the use of expert knowledge when the matter is one of beautifying a city? We realize that public opinion will not justify the payment of money for anything so vague as good taste. The guild, however, offers the services of such experts or judges as it may nominate for any particular task, free of cost to the city, except in cases where long and continuous labor is required by men professionally engaged in the supervision of similar work, such as an architect.

We are encouraged to hope that the guild will be able to perform the work for which it was created, from the experience in other cities where similar efforts have been successfully made. We have not time to refer fully to the work done in many cities in Europe and America, but it may be well to indicate the measure of success attained in New York. The necessity for expert ability in connection with every item of public work in which artistic taste may be displayed has been fully recognized. The charter of Greater New York provides for the appointment of an art commission to which all such matters must be referred, and without whose approval the city is unable to authorize or permit the execution of any work of art. The various art societies of New York form what is known as the Fine Arts Federation, and this body is empowered to suggest names to the mayor from whom selections for the art commission are made. This commission, as at present constituted, consists of three laymen, supposed to suggest good judgment in matters of art, one painter, one sculptor, one architect, and the following ex-officio members : The Mayor, the President of the Metropolitan Museum of Art, the President of the Public Library (Astor, Lenox and Tilden bequests), and the President of the Brooklyn Institute of Arts and Sciences. The services of this commission, like those offered by the Toronto guild, are without cost to the city. We would be sorry if it were supposed that the members of the Advisory Board consider themselves to be judges in all such matters. The function of the Advisory Board is merely to select the necessary judges or experts.

Turning now to the exhibition to which your attention is invited. We are able through the Copley prints to give some idea of what our neighbors in the United States are doing in this great revival of mural decoration. We may not hope to rival the work which has been done in the new Library of Congress at Washington or in the Boston public library, but can we not make a beginning? We shall hope that this exhibition will at least open the eyes of many Canadians to our short-comings. You are aware that a plan of decoration for the council chamber of the new city hall was placed before the council. It was intended that this should serve as an example of what was possible in this great structure, and it was hoped that gradually over a long range of years panel

after panel through the main halls and rooms of the building might be executed by such Canadian artists as from time to time were thought worthy of being permitted to aid in the undertaking. It was a very modestly and carefully prepared plan so far as the cost in money was concerned, but it was declined by the council. Since then Mr. Reid has offered to execute two panels gratuitously, the work to be done under the supervision of the Guild of Civic Art. This generous missionary effort on the part of Mr. Reid should be watched most carefully by all who care about the development of art in our city. If as a work of art it meets with general approbation, may we not hope that we will have the active support of every one present here to-day when another effort is made with our city council looking to a scheme of adequate decoration for the interior of these public buildings?

MANUFACTURES AND MATERIALS

The Gurney Foundry Co., of Toronto, have made arrangements to open an agency at Winnipeg.

Messrs. Close & Co., of Woodstock, Ont., recently filled an order for brick-making machinery for St. Petersburg, Russia.

The James Smart Manufacturing Co. of Brockville are preparing to put on the Canadian market a complete line of hot water boilers.

The necessary authority is being sought to change the name of the Toronto Radiator Manufacturing Co. to that of the Dominion Radiator Co., Limited.

The Spanish-American war is reported to have seriously affected the business of the plaster manufacturing companies in New Brunswick and Nova Scotia.

A new stone quarry has been opened a few miles west of Calgary. The stone will be dressed there and shipped to Vancouver. A large number of stone cutters will be employed.

Mr. Samuel Menard, of St. Camille, Que., has instituted an action against the Dominion Lime Co. to recover damages for the death of his son, who received fatal injuries while acting as fireman for the company.

Mr. John Gunn has recently discovered valuable deposits of stone, suitable for building, monumental and lithographic purposes, at Stonewall, Man. The stone, which can be easily quarried and worked, is pink and blue in color.

There is reported to exist at present in Winnipeg a "corner" in bricks, in consequence of which a large order has gone into the hands of a manufacturing firm at Grand Forks, Dakota. The local manufacturers expect to have 2,500,000 bricks ready for use next month.

Mr. Frank Gutteridge, a prominent builder and contractor of Seaforth, Ontario, has constructed a machine by means of which from eight to ten thousand pressed cement bricks can be manufactured per day. Bricks of this character are said to have been put in use in Seaforth with satisfactory results as regards appearance and durability.

From experiments which were conducted at the Watertown Arsenal it would appear that the average strength of a bolted joint is only about two-thirds that of a rivetted joint of the same sort, and that, if the diameter of bolts or rivets is rather small in comparison with the thickness of the plates, the strength of the bolted joint may not be much more than one-half that of a rivetted joint.

SILICIZED STONE.—Already, according to the report of United States Land Commissioner Hermann, a company has been formed in South Dakota for cutting, polishing and marketing the stone or silicified wood found in such marvellous quantities in the forest located near Holbrook, Apache county, Ariz. The largest, finest specimens of such petrified wood in the world there exist. Whole trunks of trees and stumps with portions of the roots appear, converted into stone as dense and hard as the finest agate, every cell and fibre of the former wood being preserved in stone. A forest of trees seems to have been entombed in the rocks and to have been preserved by a slow process of replacement by silica from solutions permeating the bed; subsequently, the surrounding sediments were washed away, but the fossils of the tree remained.

Mr. Thos. Canty, of Ottawa, has been appointed by the government superintendent of masonry construction at the new drill hall at Kingston, Ont.

CORRESPONDENCE.

Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

THE LONDON BUILDING DISASTER.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Allow me to call attention to what I consider an error in one point stated by Mr. Baillarge in his letter which appears in your February number.

He says, "It will be noticed that no strength or resistance or support is attributed to the flooring beams, which of course there would have been had the joists been all or even half of them of a single length or stretch."

At first sight it does seem as if additional strength or support would result from the adoption of single-length joists, whereas exactly the opposite is the case, and in designing a beam to support a load were the joists are continuous, five-eighths of the uniformly distributed load should be assumed to be carried by the beam, and not one-half only, as in the case of half-length joists.

For full information on this point I refer to Prof. Johnson's "Theory and Practice of Modern Framed Structures," Chap. X., Page 161.

J. W. BALMAIN, C.E.

SANDON, B.C., 14th April, 1898.

QUALITIES OF CEMENT.

DESERONTO, May 2nd, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—A "User of Cement," in the April number of your journal, has evidently not heard of the "old saw"—"Give your opinions, but don't give your reasons." Had he been content to simply express such an opinion over a nom de plume, it would not have been worth while to discuss the matter, but as a reason for the opinions has been given, it may not be amiss to examine into the question.

First, his premiss is not true in fact. Canadian Portland cement not only shows a higher tensile strength either neat or with sand at seven days, but maintains the lead until the end of all records we have. The following experiment may surprise a "User of Cement": Take a sieve of 40,000 meshes to the square inch and thoroughly sift all the cement that it is possible to get through; try to make a briquette out of the residue. Unless he succeeds better than I have been able to, he will find that the residue is merely sand, having no cementitious value whatever—thus showing beyond question that the active part of Portland cement is the fine, impalpable powder or flour; the residue which he admires is wholly inert, and of as much value as sand.

I feel assured Canadian manufacturers would welcome the news, if true, that they were burning their clinkers too hard—it might save a few cents a barrel. Perhaps "A User of Cement" does not know how very hard our burnt clinker is, and that the harder it is burned the more difficult it is to reduce the clinker to the necessary fineness modern specifications demand.

The truth is that the Canadian manufacture of Portland cement is and has been in advance of the requirements of our engineers and architects. For the past 10 or 15 years the best minds in the engineering world have been studying the question. On certain points there is a practical consensus of opinion. One of them beyond rational criticism is, that the finer a cement is ground the better; hence, the degree of fineness is merely a question of commercial practicability. A second point on which there is a fair degree of agreement is, that a Portland cement should show a proportionate increase in strength at seven days over what it does at three days, but it surely will not be contended that if a given cement gives 600 lbs. in seven days and in one year increases to 700 lbs., that a second brand which gives only 300 lbs. in seven days and at one year shows barely 500 lbs.—that the second is better than the first. I venture to submit, the quicker a cement reaches its maximum strength the better, always provided it does not go back later on.

Yours respectfully,
M. J. BUTLER, M. Can. Soc. C.E.

The new building now in course of construction for the Molson's Bank at Vancouver, B.C., will be five stories in height, 90 × 100 feet in size. The basement story will be built of granite, the stories above of Calgary freestone. The banking room, 70 × 30 feet, will be finished in quartered oak and marble, with mosaic floors. Messrs. Taylor & Gordon, Montreal, are the architects.

LEGAL.

DENISON V. WOODS.—Judgment by Chief Justice Burton in the Court of Appeal, Toronto, on appeal by defendant from order of Rose, J., dismissing defendant's appeal from report of Neil McLean, an official referee, upon a reference to him for trial under sec. 107 of the judicature act. The action was brought by Arthur R. Denison, an architect, against Michael J. Woods, to recover remuneration for certain services rendered to defendant in respect of valuations of Toronto Island property and in preparing case for arbitration and plans, etc. The referee found that plaintiff was entitled to be paid $397.50, based upon an allowance of $2 an hour for 142½ hours of his time and $1.25 per hour for 90 hours' time of his clerks. The plaintiff was paid by defendant before action $25 on account, and defendant paid into court with his defence $300, leaving $72.50 due, according to the report. The referee found that no proper tender was made before action, and plaintiff was entitled to his costs. The defendant contended that upon the evidence a much smaller sum should have been allowed. Appeal dismissed with costs.

PERSONAL.

Mr. Joseph Roy, contractor, has been elected a member of the Council of St. Cunegonde.

The death is announced of Mr. W. L. Prince, a well-known contractor of St. John, N.B.

Mr. Chas. M. Whitney, a well-known plumber, died recently at his home in Woodstock, Ont.

Mr. E. Adams, architect at the Kingston Penitentiary, who was recently suspended as the result of a disagreement with the deputy warden, has been reinstated.

Mr. Ernest R. Rolph, of Fort Macleod, N.W.T., formerly of Toronto, was married in Toronto on April 26th to Florence May, daughter of Solon W. McMichael, of H.M. Customs.

Mr. Geo. Taylor, representative of the Gurney Foundry Co. in London, England, has resigned and accepted the position of manager of the Toronto branch of the Gurney, Tilden Company's business.

Messrs. Darling & Pearson, architects, will shortly remove from the Mail Building to the top floor of the Toronto Street Railway Company's new building, corner of King and Church streets. A handsome suite of offices is being fitted up for their accommodation in this new building, in which they will be the only tenants.

A SERIES of experiments were recently made by Prof. Frank Soule in the laboratory of the Engineering Department of the University of California, to determine the holding power of cut and wire nails. The wood used in the tests was Oregon pine and redwood. The general conclusion arrived at as the result of these tests, is that for most uses and under most conditions, the cut nail is superior to the wire nail.

HEAT-RESISTING PUTTY.—A handful of burnt lime is stirred in 120 grams of linseed oil and boiled down to the ordinary consistency of putty. The elastic mass, says the Werkstatt, is then allowed to dry in a thin layer in a place not reached by the rays of the sun. It becomes very hard. For use the putty is held over the fire or the cylinder of a lamp, and the cracks caused by heat or the cracked pieces are cemented with it. Over the lamp cylinder the putty becoms soft and very pliable, but after cooling it gets very hard and binds the different materials very firmly together.

WHAT TO STUDY.

PROF. Norton, in an address before the Boston Architectural Club, advised young students of architecture to study poetry above all other things. Not merely the poetry of Shakespeare, of Byron, but the poetry which finds expression in the west front of Rheims Cathedral, in the campanile of Giotto, in the score of of the Moonlight Sonata, in the sentiment of Murillo's madonnas, the study, in fact of the finer qualities which tend to cultivate the taste, to make the architect an artist, and to fit him for the large æsthetic responsibilities which he must assume if he is true to his profession.

This is, after all, the real object in view in foreign travel. It matters not whether we sketch or measure, whether we look with the eyes or with the finer inner senses. The prime object of all travel is to enlarge the æsthetic appreciations, and when it comes down to a practical application the successful traveling student must think out for himself the particular lines of expression in drawing or in study which would best develop the qualities which he feels are most lacking in his composition.

TESTS OF BRICK PIERS.

A SERIES of tests of brick piers was recently conducted at McGill University, concerning which Prof. Cecil B. Smith writes to the Brickbuilder as follows:

The following tests of the crushing strength of brick piers are interesting both as regards the absolute loads recorded, and also because, while with lime mortar brickwork the strength of the mortar determines the load which the pier can carry, this is not so where good Portland cement mortar is used. The tests show that the quality of the brick determines the pier strength, as the first and second brands of cement were rather superior to the third and fourth, as is shown by the tests of a cube of mortar from the same mixing; but the superior strength of the pressed brick became evident in spite of this.

Another interesting point always brought out by such tests is that the pier strength per square inch is considerably less than that of a single brick on its flat, but considerably more than cubes of mortar, i. e., beds of mortar are far stronger than cubes, and single bricks than built walls.

The compressions recorded are very small, owing to the rigidity of the mortar, but piers laid in lime mortar give very much greater compressions per unit load.

TESTS OF BRICK PIERS.

MCGILL UNIVERSITY LABORATORIES, MARCH, 1897.

Dimensions of Pier.	Mortar.	Brick.	Crushing Strength, lbs. per square inch. At 1st Crack.	Crushing Strength, lbs. per square inch. Maximum Load.	Age.	Failure. Initial.	Failure. Final.	Compression per foot. 400 lbs. per square inch	Compression per foot. 100 lbs. per square inch.	Strength of Mortar 3 in. x 3 in cube.
8.1 ins. x 8.1 ins. 11.6 ins. high. Joints, ⅓in. thick.	1 Canadian Portland. 3 Sand.	Ordinary well-burnt Flat Brick.	822	1,231	3 Weeks.	In the Brick.	In the Brick.	.001 ft.	.0025 ft.	711
8.1 ins x 8.1 ins. 11.6 ins. high. Joints, ⅓in. thick.	1 German Portland. 3 Sand.	"	990	1,230	"	"	"	...	...	...
8.2 ins. x 8.3 ins. 10.5 ins. high. Joints, ½in. thick.	1 English Portland. 3 Sand.	La Prairie pressed, Keyed on one side.	1,130	1,524	"	"	"	.0025 ft.	.004 ft.	...
8.4 ins. x 8.4 ins. 10.75 ins. high. Joints, ¼in. thick.	1 Belgian Portland. 3 Sand.	"	1,204	1,985	"	"	"	.003 ft.	.0045 ft.	677

N. B.—The crushing strength of a brick similar to those in piers Nos. 1 and 2, laid on flat and bedded in plaster of Paris, was 1,400 lbs per square inch for first crack, and 2,400 lbs. per square inch maximum load.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Slates. SLATES should always be laid with a certain lap, that is, each course should cover the next but one below it to a certain extent, just the same as shingling, and the amount of surface covered should not be less than two inches on the length of the third slate. Thus, there will be a certain width of slate exposed to the weather; this width grows less as the lap of the slate increases. The weathering or gauge for any kind of slating is found by deducting the lap from the length of the slate and then halving the remainder, thus: If counters slates are to be laid with a 3-inch lap, the weathering will be $\frac{20''-3''}{2} = 8\frac{1}{2}$ inches, the counters being 20" long. Each course of slates "breaks joint" with the one below it. The average weight of ordinary slating may be taken at 700 lbs. per square of 100 superficial feet. The valleys of slated roofs are generally laid with lead, as this metal is superior to tin or galvanized iron for the purpose, the lead being turned up the roof on each side of the valley sufficient to drain away all water. Hip rafters are often covered with sheet lead, which is the best method, or finished with thick, saddle-back slates finished on top with some sort of an ornamental roll, which is cut to fit over the angle. Slate does not absorb water, and, as it is hard and close grained and smooth on the surface it can be laid safely at as low a pitch as $22\frac{1}{2}$ degrees, and its lasting qualities are very great; and, everything taken into consideration, it is a very much cheaper roofing material than shingles in the end. One fault of slate is that it will not resist a very great heat, and is often dangerous on that account, as a fire in an adjacent building may be so hot as to start slates breaking and falling on the heads of onlookers, even if the buildings are thirty or forty feet apart. With the exception of tiles, slates make the prettiest of roofs, if the pitch is not too low, but it seems to be one of the faults of our designers to make their slate roofs much too low in the pitch, owing, no doubt, to reasons of economy. To look well a slate roof should never have less than a one-third pitch, and as much more as circumstances will permit.

Cement Drain Tiles. A GOOD serviceable drain tile may be made by any bricklayer or plasterer in case the ordinary tiles are not available. Provide a centre core of such size as may be required to form the diameter of the pipe. Stand this in a box—a round mould is better—leaving space enough around the core to allow of sufficient thickness of pipe; and if a number of pipes are to go together, provide—by a mould—some means for making a connection. Mix two parts of best Portland cement with three parts of clean sand, the latter to be of various degrees of fineness, from the very finest to the size of a pea, and in such proportions that the finest will fill up all vacancies as the cement finely coats each particle; that will be about $1\frac{3}{4}$ parts of fine sand, $\frac{3}{4}$ parts of medium, and $\frac{1}{2}$ part of the coarser kind. These materials must be thoroughly mixed dry, and the mortar rammed solid into the mould, and the core must be turned partly around every now and again, in order to keep it loose. It is highly important that the right amount of water be used, as every particle of cement and sand should be wet, but the mortar should be left stiff enough for the rammer to bring up solidly on it, and press the material firmly together instead of displacing it horizontally. The core may be withdrawn almost immediately after the pipe is finished, and in good weather the outside mould may be removed in about half an hour. The pipes should be kept under cover for about two weeks, and then put out in the sun and air and well wet every day. They will be ready for use in about six weeks after being made. Pipes made this way possess several advantages over the regular glazed drain tiles, and are specially adapted for carrying away sewage as they are not affected by the chemicals and gases that are generated from sewage. Any carpenter can make proper moulds in which these pipes may be made. The core may be made in the lathe, having a shoulder turned on the expanded end to form a joint for the small end of the pipe. The outside mould may have a square outside, but the inside should be made the shape the outside of the pipe is to assume. It should be in two halves, and may be hinged on one side, and fastened, when in use, on the other side by hooks and staples or other device. The core should always be withdrawn before the outside mould is removed.

Kitchen Traps. THE traps in general use under a kitchen sink ought to have a separate ventilation pipe leading from the upper side of the trap to the roof or other safe place. If this system is adopted, it will render the gases and bad smells emanating from the slops or sewage from the main drain, or other obnoxious features, that sometimes result from siphonage, harmless, as the draught in the ventilating pipe will carry away any sewer gas that may reach the pipe. There are very few traps placed under sinks that do their work effectively, owing to the fact that, as a rule, they are not of sufficient diameter. The water seal in a trap of small diameter is easily broken both by siphonage and by evaporation, and these are the main reasons why the trap should be of large calibre or have separate ventilation. An authority on the subject of traps gives the following as the requirements for effective performance of a kitchen trap:

"(1) It should do its work by means of a water seal alone, which may be accomplished if sufficient water be injected and held in it. (2) It should be self-scouring. (3) It should be capable of resisting the severest tests of siphonage, momentum, and back pressure that can ever possibly be brought to bear in plumbing, and this without the aid of special ventilation. (4) It should contain a body of water large enough to be practically proof against evaporation. (5) It should be simple. (6) It should be economical to manufacture. (7) It should be made of durable material. (8) It should be so constructed that its interior can be inspected without removing the trap or any part of it. (9) It should have a tight fitting clean-out cap, arranged to be removed with perfect ease, and to admit of removing any foreign substance that may have lodged in any part of it. (10) All parts of its clean-out cap should be under water, to insure detection of leakage if any occurred. (11) It should be so formed as to offer the minimum of resistance to the flow of water through it. (12) It should be independant of the fixture to which it is attached, and should be easily connected or disconnected." This, of course, is an ideal trap, and no such thing is made, or perhaps ever can be made; but several of the requirements as set forth may be obtained in the one trap. For instance, heavier traps than are now used may be attached to the ordinary waste pipes, thus securing a larger body of water for the seal, which would offset evaporation to a large extent, aud in some measure prevent a back flow of gas. Then the clean-out cap might be made much larger, so that the interior of the trap could be more readily got at to clean. Traps themselves should be placed in positions where easy access to them obtains.

Hardwood Floors. CANADIAN white maple, when properly seasoned, makes a good durable floor if care is taken in laying it, and placing it where it will not be exposed to damp, or likely to be soaked with water at any time. Where possible, the material used should be weather seasoned, as maple that has been kiln dried is apt to swell with the least possible moisture, such as being washed, or by absorbing the damp from newly plastered walls, and expands to such an extent that injury may result. Weather seasoned maple does not swell so readily nor so much when moist, and experience has proven that its lasting qualities are greater than when kiln dried. As of maple, so of black birch, that which is weather seasoned is, in many respects, better than when kiln dried. In weather seasoning maple, birch, cherry and beech, it should be so placed that neither rain or the sun will get on it, as the first will be sure to doze it, while the second will crack, split or warp it. If intended for flooring, warping does not much matter, as it will be ripped into strips less than three inches in width, so that when it is run through the flooring machine, the warping will be pretty well taken out of it. Beech makes a very handsome floor, and if used in a room where it is intended there will be no carpet, it may be waxed or polished, and will have a fine metallic lustre. Red beech, of course, is the wood intended. Cherry, while one of the handsomest of woods, is not very well adapted for flooring, as it is rather soft, and shoes with sharp angles, or having metal nails in them, would be apt to mark it if the floor was left bare and polished. Perhaps, after all, there is no wood grown in Canada that so well fills the requirements needed for a good floor as our white oak. This wood, which deserves more attention by architects and builders than it usually receives, makes at once a handsome, durable and lasting floor; and if quarter sawn and wisely selected, is superior in appearance, when properly finished, to any other wood grown. A quartered oak floor, laid in a room where all the woodwork is quartered oak finish, is a sight that is sure to impress everyone who sees it with an idea of solidity and worth, that never obtains in the use of other woods. It is not a very good method to mix maple and birch together in the one floor. They do not last equally, neither do they wear equally, and when a floor wears out in one part, the whole of it must come up, the worn and the unworn, whereas, if it had been of one kind of material it would have worn evenly, and throughout. Another reprehensible custom is that of laying flooring in dark and light strips alternately. By so doing it gives the floor a sort of "cheap John" appearance, and every joint is so emphasized, that what would not be noticed if the boards were all of one color, will be sure to attract the eye when the joint is defined by a change of color. The flooring should be selected for color as well as for widths, and all that of one color should be laid together. It is better to wax a floor than to oil it; in fact, an oiled floor, unless well rubbed in and shellaced, is a perpetual nuisance, as it is almost impossible to keep dirt from working its way into the pores of the wood with the oil, and ruining it forever so far as its appearance is concerned.

Useful Hints. IN order to cut a rafter of any pitch to the proper bevels with the aid of the steel square, proceed as follows: Fig. 1 shows a diagram of a roof, having a twenty-six foot span any span will answer. The span of a roof is the distance over the wall plates, measuring from A to A. Here are two rafters shown in position, the one on the left having a pitch of one-quarter, and marked B, the rafter on the right marked C is one-third pitch. Their angles, or inclinations, are called quarter and third

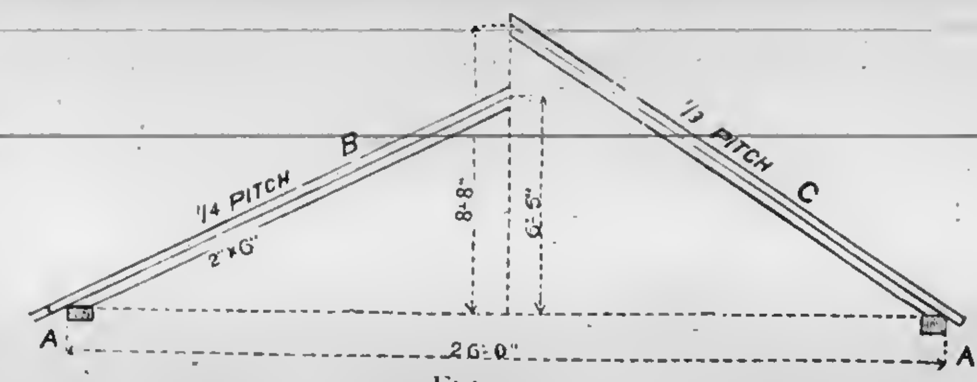


FIG. 1.

pitch resectively, because the height from level of wall to ridge or peak of roof is one-quarter or one-third the width of the building, as the case may be. Two pitches are shown here in order to exemplify the methods of obtaining the different bevels. At Fig 2 the rafter B is shown drawn to a larger scale; it is for the quarter pitch. It is supposed to consist of a piece of stuff 2 x 6 inches, and 17 ft. long. The portion of rafter at O is left 3" wide only, and when in place projects over the building and forms the eave. This may be left of such length as may be desired. A centre line is marked on the width of the scantling, and it is from this line the square is worked. Apply the square on this line as shown in the sketch using the figures 6 and 12, which give both the proper angle and the exact length. Work from right to left, placing the 6" mark on the

tongue and the 12" mark on the blade, over the working line. The tongue gives the cut for the top of the rafter, and blade gives the cut for the bottom. As the building is 26 feet wide, we must repeat the marking on the working line thirteen times, as thirteen is half of 26. Care must be taken in laying of the lengths or the rafter

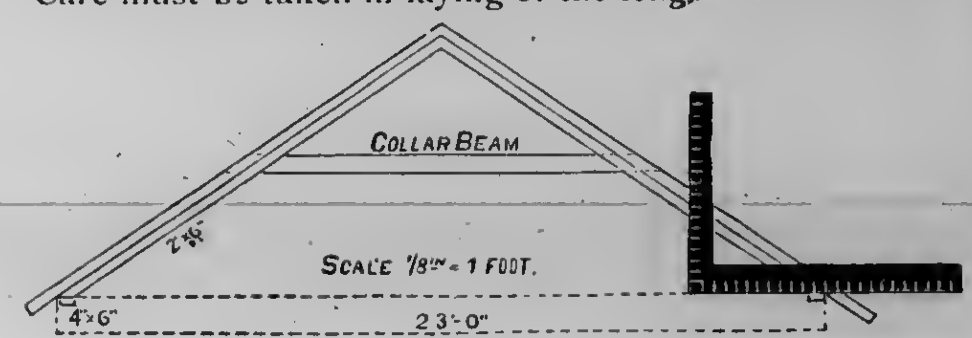


Fig. 2.

will not fit exact. To get the length and bevels of a rafter for a one-third pitch the figures to be employed are the 8" and 12" marks. The square must be applied as before, using the 8" mark on the tongue and the 12" mark on the blade. Keep the tongue to the right, which gives the plumb cut on the top of the rafter, while the blade gives the level or bottom cut. The square must be applied thirteen times as before. In all cases the square must be applied half as many times as the span measures in feet. Roofs more acute than the ones shown may be dealt with as follows: For instance, if the roof is half pitch or at right angles, 12" and 12" on the square will give poth pitch and bevels. When a roof is more acute or "steeper" than a right angle, take a greater figure than 12" on the blade, but keep the 12" on the tongue, thus: For a three-quarter, or "gothic" pitch, take 16" on the blade and 12" on the tongue, and repeat on the pattern, half as many times as there are feet in the span. Whenever an architect's drawing for a roof is to be followed, it is an easy matter to find out how to employ the square to get the length and bevels of the rafters, by laying it on the drawing as shown at

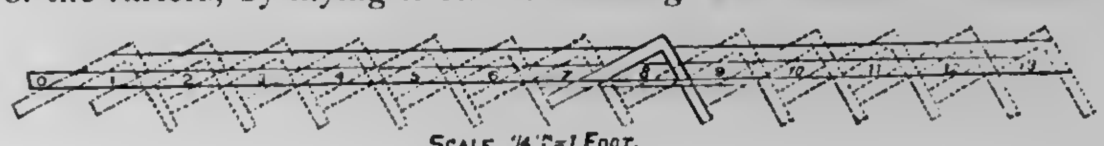


Fig. 3.

Fig 3. Of course, something depends on the scale to which the drawing is made. If any of the ordinary fractions of an inch are used, the intelligent workman will have no difficulty in solving the problem. Sometimes there may be a fraction of a foot to deal with in the span of a building. In such case it may be dealt with as follows: Suppose a building 26' 8" wide, deal with the feet as shown, then, as 4" is the half of 8", apply 4" on the blade and 2" on the tongue marks for a quarter pitch, and 4" and 4" for a half pitch. The lines down the tongue will be the plumb cuts at the top of the rafters, and the lines along the blade will be the bevels to sit flat on the top of wall-plates. To make good close work, be exact in lining off and sawing, and the result will be satisfactory.

Some Paint Tests.—The results of some paint tests were exhibited at the October meeting of the Civil Engineers' Society of St. Paul, says the Railway Master Mechanic. Twenty odd samples were shown of black and more or less rust-roughened plates of sheet iron, which had undergone six months' exposure to locomotive smoke while suspended from the roof of the Union Depot train shed, about 50 feet above the tracks. The iron plates, originally new and bright, had each received one coat of paint and had been subjected to equal exposure. The red lead samples gave the best results; next came the white lead, followed by the iron oxides and the asphaltum, which were generally in much better condition than the graphites. An anti-rust specimen was the brownest specimen of the lot.

DOMINION PLUMBING AND HEATING SUPPLY ASSOCIATION.

This is the title of a new organization, composed of manufacturers and wholesale dealers in plumbers' goods and heating apparatus, formed at a meeting held for the purpose in Montreal on April 15th. The following officers were elected:

President—J. R. Wilson, of Thos. Robertson & Co., Montreal.

First Vice-President—A. A. McMichael, of James Robertson & Co., Toronto.

Second Vice-President—W. H. Wiggs, of the Mechanics' Supply Co., Quebec.

Secretary-Treasurer—A. G. Booth, of Toronto.

The above, with the following, compose the Executive Committee: Col. F. Massey, of the Gurney-Massey Co.; Wm. Greig, of Warden, King & Son; A. Lariviere, of Amiot, Lecours & Lariviere, and J. M. Taylor, of the Toronto Radiator Co.

A gentleman interested, to whom a representative of the Architect and Builder applied for information, stated that the new association was simply an enlargement of the local association established in Toronto last year. The restrictions imposed by the Dominion Plumbers' Association had become so burdensome that the manufacturers and wholesalers were compelled to organize for mutual protection. As an illustration of the nature of these restrictions, this gentleman stated that manufacturers of brass goods were forbidden to sell to the T. Eaton Co., who are extensive buyers of this class of goods. Another regulation is that wholesalers shall not sell to or recognize as a legitimate plumber a person who does not carry on business and display his goods in a window on a business thoroughfare. As a proof of the absurdity of this regulation, it is stated that two of the leading plumbers of Montreal have no office or workshop on a business street, but make their headquarters at their place of residence.

While apparently willing to comply with what they consider to be reasonable regulations for the welfare of the trade, the members of the Dominion Plumbing and Heating Association express their determination to unitedly resist arbitrary dictation at the hands of the master plumbers' organization. They affirm that all the supplies required by the trade can now be produced and sold in Canada at much lower prices than the plumbers would be obliged to pay for imported goods of equal quality.

THE CANADIAN CEMENT INDUSTRY.

The annual report of the Ontario Bureau of Mines, recently published, states that the number of men employed in the manufacture of cement in the last four years has increased from 168 to 231, the wages paid for labor from $44,878 to $89,060, the quantity of cement manufactured from 85,903 barrels to 181,495 barrels, and the value of the cement from $109,834 to $246,425. The greatest increase, however, has taken place in the production of Portland cement, which has gone up from 30,580 barrels to 96,825, while the natural rock cement has only increased from 55,323 barrels to 84,670. In value natural rock cement shows an increase of $27,349, while Portland cement shows an increase of $109,242. This no doubt is largely if not chiefly owing to the growing interest in the building of good roads in our towns and cities.

Arrangements are in progress for the annual convention of the National Master Plumbers' Association which is to take place in Quebec the latter part of June. The President, Mr. Joseph Wright, of Toronto, is at present on a visit to British Columbia.

ENGLISH VIEWS ON HOT WATER HEATING.*

W. J. Maguire.

If the boiler is making a fuss, he will be suffering either from wind in his stomach, or from a stoppage in his circulating tubes or his inside, tending to choke him to bursting. If the noise be a soft and regular one—thump, thump, thump—heard all over the house where the pipes run, you may safely diagnose air lodgment as the complaint. If the noise be a succession of sharp, loud, irregular raps, as of iron struck with a hardwood mallet, you will probably be correct in deciding that a deposit is choking the flow or return pipe, or both, and you will apply prompt remedies to prevent fatal rupture. Every high pressure circulating boiler should be so made and fixed that no bubble of air can find an abiding place in the interior, or in other words, so that the boiler shall be always absolutely full of water in actual contact with the whole internal surface.

The ordinary boiler, in section like a boot, is very often improperly formed and badly fixed. Every boot boiler should have the top of the boot—the instep—sloping upward from the front, or toe, to the back. When flat, some internal inequality of surface will be found to hold air, and thus create constant noise and be a cause of weakness where the boiler is exposed to fierce heat by keeping the water from internal contact with the iron or copper plate. The boiler toe next the fire should be rounded, not angular, and sharp angles should be avoided where in contact with fire or flue heat. Every such boiler should have a perfectly smooth level top, or be otherwise formed to secure the easy exit of every bubble of air through the outflow pipe.


Carey Castle, Victoria, B. C.

Manholes should be provided both on the top of boot and on the front of the body of the boiler for efficient cleansing. In fixing the outflow, the end of the pipe should not be entered one hair's breadth below the inner top surface. A flange socket screwed down on the top of the boiler, into which the outflow pipe can be screwed, the hole drilled in the boiler being one-eighth of an inch smaller than the outer diameter of the pipe, will effectually prevent the pipe entering the boiler if screwed down too far in the socket. For the same reason, the outflow pipe should always be led from the top plate, as it is almost impossible to take it from the side or back without leaving space for air. I give diagrams of these methods to explain the dangers. For convenience of manipulation in fixing and cleansing, I prefer the return pipe carried through the top of the boiler also, and extended to within six inches of the bottom inside by a short piece of pipe of the same diameter as the return pipe screwed on. The outlet and inlet pipes should be kept as wide apart as possible, to leave space for the flue damper to work between them, and also to allow the boiler to be set slightly out of level, the outlet end being say one-eighth of an inch higher that the inlet, to insure free escape of air bubbles; if the outlet is not drilled at the extreme end of the boiler, then the top must be set dead level, else the bubbles will lodge at the extreme end beyond the outlet and cause trouble.

Every boiler should have a pipe taken from its lowest point with a plug stopper or locked valve for cleansing, but no pipe for drawing water for house use should be taken off the boiler direct.

The intermediate hot cylinder system of circulating hot water pipes is now generally adopted; it is safe, and certain to yield hot water when hot water is wanted. We know this is not the case with hot cisterns placed on the same level as the cold cistern, generally hidden away in a roof, where we have to creep on our hands and knees, as if we were exploring the recesses of the Pyramids of Egypt; have no light to see nor room to turn when we get there, and now and again succeed in setting fire to the house in striking matches or letting sparks fall from our taper. The intermediate cistern of galvanized iron or copper may be placed in such a position above the boiler level as to allow a quick gradient to the circulating pipes, within say 10 to 30 feet from the boiler, and where heat radiated therefrom may be utilized as in a linen closet. The hot cistern should be tested to stand double the pressure due to the head of water from the cold cistern. The best form of cistern to resist pressure is a cylinder, though any form capable of resisting the pressure is admissible; a cleaning door screwed down securely should be provided for each hot cistern. Five strong screwed bosses should be affixed to the hot cistern and galvanized over after being fixed—two on the top and three round the bottom—in proper position to receive the two circulating pipes, one supply pipe, one basement draw-off pipe, and one upward expansion pipe.

In general practice no question of importance arises concerning the arrangement of these pipes, except as to the cold supply pipe. Some authorities contend that it should be led direct into the boiler, but I hold it to be bad practice to allow dead cold water to enter a very hot boiler which is in direct contact with the intense fire of a close range. Other authorities contend that the cold supply pipe should branch into the return pipe from the hot cistern, but here the same objection exists, with another added, for the junction, being subjected to sud-

* Registered Master Plumber. Condensed from Manchester Health Lectures.

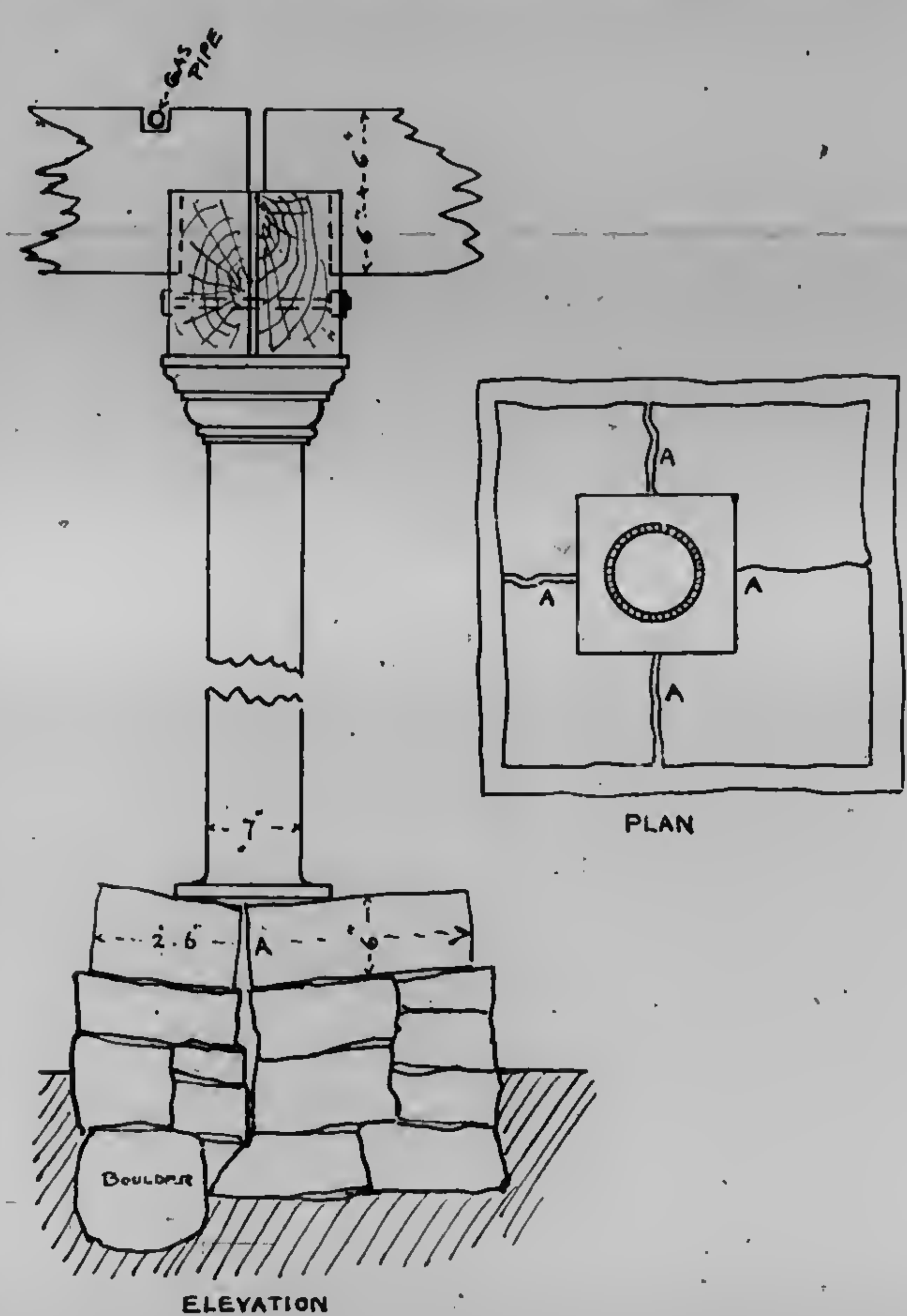
den alternations of extreme heat and cold, is liable to give way. I have seen numerous failures in joints so formed.

The proper method is to connect the cold supply into the hot system at the lowest level and opposite the return pipe opening to the boiler, so that the cold water being the heaviest may enter and flow straight across in the direction of the return pipe and down to the boiler, mingling but slightly on its way with the lowest stratum of warm water in the system, so as not to enter the hot boiler dead cold, and yet not to intermingle with the upper and lighter strata of hot water in the cistern, so as in any way to prevent the very hottest water being drawn off when required. The basement hot supplies may be taken from the special basement hot pipe, so as not to affect the hot supply to baths and upper floor hot draw-off taps. And all the hot water supplies to levels above the basement may be branched direct from the upward expansion pipe. There is no positive objection to allowing all the hot supplies to the basement and upper floors to be drawn from the one upward expansion pipe. By placing the hot cistern judiciously, so as to allow this upward expansion pipe to be given a quick ascending gradient, the water will heat all through to the top by a circulation within itself of the water molecules and by the air and steam bubbles rising through the column of water from the boiler, conveying heat with them; but in some instances it may be necessary, especially where there are long horizontal branches to baths, etc., to induce a slow circulation of the hot water along the branch pipes, so as to insure prompt delivery of hot water when taps are opened. This can be effected by running a small half-inch bow return pipe back from the far end of such branches to the hot cylinder. A definite plan to suit all cases can not be laid down; each arrangement for each house and all the circumstances require consideration. Abundant opportunity is afforded for the exercise of ingenuity and forethought. The master plumber's practical experience, and his knowledge of the laws that govern the movement of hot and cold water through pipes, will stand his employer in good stead. Ask a dozen men to explain the cause of circulation of hot water through pipes, and ten of them will tell you that the hot water rises because it is lighter than the cold, and they will also tell you that smoke rises up a chimney because the heated air is lighter than the air in the house. But the fact is that neither the heated water nor the heated air rise actively. They are both, if active at all, trying to fall toward the earth, for each have a certain gravity or weight of their own; on each column of heated air and heated water, the attraction of gravitation acting from its centre in the earth is exerting its utmost force, and if left to its influence they would certainly descend toward the earth; but the columns of hot air and hot water, though they do not actively rise, are actively pushed up by the superior gravity or weight of the corresponding columns of cold air or cold water, as the case may be, just as the heavy side of a scale pushes up the lighter side. It is therefore accurate to say that hot water and hot air are forced to rise by the attraction of gravity drawing down the cold water and cold air; and it is therefore inaccurate to say that they rise because they are lighter. It is important to know and remember this in the practical arrangement of hot water circulating pipes and in the ventilation of buildings and drains.

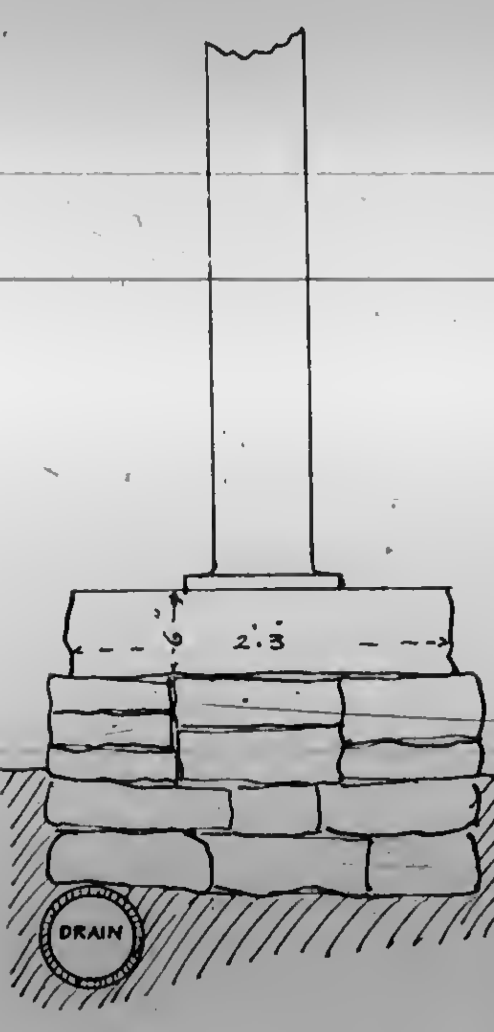
The disagreement as to wages which threatened to cause a strike on the part of the journeymen plumbers of Winnipeg, has been satisfactorily adjusted.

DOES THE PUBLIC NEED PROTECTION?

THE accompanying sketch is a sample of work done without qualified architectural supervision. It occurred in a building where hundreds of people assembled every week, and it is a mystery that a serious accident did



not occur under the circumstances. To all appearances, the addition of a few tons more in weight would have caused several of the columns to drop through the



badly bonded piers, and a drop of only a few inches would have permitted the joists to drag away from their slender hold on the beams, and precipitated hundreds into the basement.

Four of the piers with their cap stones were split, as shown in sketch at A A, while a drain pipe ran beneath one side of one of the remaining piers.

That the public needs protection is well demonstrated in this specimen of work, and it should serve to punctuate the lessons taught by the London City Hall disaster and the collapse of the roof of the public hall in Oshawa.

It is high time that the government should insist that every person who desires to assume the title of "architect," shall first pass an examination to discover his fitness for the responsible duties which an architect is called upon to perform.

ST. JEAN BAPTISTE CHURCH COMPETITION.

FOLLOWING are the conditions and the report of the judges in the recent competition open to the Catholic architects of Montreal for plans for the new St. Jean Baptiste church to be erected in that city:

CONDITIONS OF COMPETITION.

The syndics and churchwardens of the Parish of St. John Baptist of the city of Montreal invite the Catholic architects of this city to compete for the preparation of plans for a church, vestries, parochial residence, a chapel for the use of congregations, and a sub-basement, that the above named parish proposes to erect on Rachel street.

Two or three competent judges will be named to choose the plans.

The following are the conditions governing the competition:

1st. The successful architect will prepare all final plans and specifications with the help of the syndics and churchwardens.

2nd. The second prize will be $200.

3rd. The third prize will be $100.

The churchwardens will entrust the preparation of final plans and the superintendence of the works to the successful architect, provided said architect shall pessess the proper qualifications and give the required securities.

The plot of ground on which the proposed buildings are to be erected is situated on Rachel street, facing also Sanguinet and Drolet streets, and on a lane in the rear.

For the size of ground see the plan exhibited in "Hospice Auclair."

The competitors are not compelled to follow a special style—Gothic only being excluded.

The "facade" of church must face on Rachel street, the parochial residence on Sanguinet street, and the vestries on Drolet street. The chapel to be situated where deemed best by the architect.

All drawings to be made to a ⅛" scale.

The following plans are required: Front elevation, side elevation, plan of sub-basement, plan of main floor, longitudinal section, transverse sections of sanctuary and of galleries.

All the plans to be drawn on ordinary drawing paper, not glazed nor polished.

Plans to be lined only, with the exception of floor plans and sections which shall be colored so as to show the nature and kind of materials used in the proposed construction.

The plans must not bear the author's name, but will be marked with a motto or signed with a fictitious name. A sealed envelope marked with the motto or fictitious name, and containing the name and address of the competing architect, will be sent in with the drawings, and the said letter is to be opened only if plans bearing same motto or name are accepted. All drawings to be delivered without cost at "The Hospice Auclair" on or before the twenty-fifth day of April, 1898, without any indications whatever of the name and residence of the sender.

The churchwardens allow 35 days for the preparation of plans, commencing to count at the time of the first publication of advertisement in La Presse and La Patrie.

The total amount voted for the construction of proposed buildings is $130,000.

The roofs and walls are to be fireproof.

The church is to be sufficiently large to contain 450 pews. The same number of pews to be placed in the basement.

The sub-basement must be 14 feet high, and be filled with closets, etc., etc.

In the church the following requirements to be considered:

An incline organ loft; at least two concealed galleries for religious congregations, each of which must seat from 50 to 60 people; one specially wide aisle in the centre; one good aisle (transverse); eight confessionals in the main church and eight in the basement; one room for catafalso; one baptismal font, and one record room; an easy communication for choir boys from basement to sanctuary; several doors on main facade and as many as possible on other streets—one on Sanguinet street and one on Drolet street; the sanctuary floor to be above the level of communion rail; as few columns as possible, and at all events not more than six; the pulpit to be as near the sanctuary as possible; the altar, now under construction, not to be taken into consideration by the architects; the chapel to contain from 800 to 1,000 people; the chapel to be so situated that on particular occasions it may be opened and permit those occupying the chapel to see the ceremonies in the main church; the heating apparatus to be placed under the sacristy and to heat the several buildings; the building to be particularly well drained; a door to be provided in cellar for carriages.

Size of vestry, about 26′ x 30′, fitted with wardrobes, closets, etc., etc.

For other details see the parish priest.

REPORT OF THE EXPERTS.

In estimating and deciding the merits of the different competitive plans, we were compelled to guide ourselves by the written conditions imposed on the architects, and to follow them very strictly.

We first took into consideration the main object of the proposed building, the place occupied by the public, compared with the situation of the sanctuary where the ceremonies will be celebrated, and the facilities offered the audience to hear the predication.

Starting from this principle, we made a thorough study of all the drawings, trying to determine which plan solved most perfectly the problem of disposition of pews and pulpit, and also of acoustics.

We are of the opinion that all minor detail of plans must give way before those primordial conditions.

An important condition imposed by the wardens of the parish of St. John Baptist is the limited cost of $130,000. We consequently had to carefully study the different schemes and propositions of the architects in the light of the probable cost of their proposed building.

After a very careful study of all plans and propositions submitted, as well as written explanations sent in by some of the competitors, and guiding our decision by the conditions imposed by the churchwardens of the parish of St. John Baptiste, we came to the conclusion that the plans signed "In hoc signo Vinces" were those which best answered all the imposed conditions.

The second prize is given to he plans marked "Ad Dei Gratium," and the third to those marked "Ecce."

We cannot but feel that praise is due to all the other competitors. Their plans were all very artistic, beautiful and rich in ideas.

We had a very hard task before us, and it was not without much study that we came to a decision.

Hoping that this will be accounted satisfactory, we remain, very humbly,

(Signed) P. AUDET, Ptre.
F. X. BERLINGUET, Architect.
DECARIE, Ptre. (Dissedent).

THE COMPETITION EVIL.

THE following letter, from the chairman of the committee in control of the Stratford City Hall competition, in reply to objections urged by a Toronto firm of architects to the terms of the competition, clearly indicates that by entering competitions of this character architects are cutting their own throats:

GENTLEMEN,—In reply to yours of the 11th inst., would say: (1) The regular architectural fees at the present time are simply a matter of bargain, and we know for a fact that 4% is above the average paid for such work this season, and furthermore, some of your best Toronto men would only be too pleased to secure the appointment at that figure (no travelling expenses either). (2) The information we have sent out we consider covers quite sufficient instructions to enable an architect to form an idea of what we require, unless relating to the old building. This should be personally inspected in order to obtain the necessary information required. Several architects have already done so. (3) Experts may be appointed to assist us in the final selection of plans, but we will reserve the right to make such appointment. However, you may rest assured no favors will be given; we want the best. (4) As to being misled regarding final cost, I would refer you to "Municipal Buildings" Toronto Expert work no doubt—but from such Good Lord deliver us, or we are swamped.

In conclusion, would say the terms we are offering are much more liberal than those lately given by St. Thomas. We are informed that that municipality had a large number of first class designs submitted—quite sufficient to choose from and obtain a most creditable building, fully in keeping with their other public edifices.

Yours respectfully,
GEO. F. INGRAM.

THE ST. THOMAS CITY HALL COMPETITION.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—The experience gained by at least some of the gentlemen who ventured the risk of competing for the building plans, elevations and specification of the new St. Thomas town hall, lately advertised in your admirable journal, is not a pleasant one.

That they might fail in such a competition was one of the contingencies for which they were quite prepared; but that the Chairman of the Building Committee should have failed to acknowledge the receipt of the papers, and also to advise them of the result of the competition, was what they did not expect.

After retaining the papers about a month they were returned, subject to express charges and without a line of advice or information from the Council as to the result.

They would still be ignorant of the fact that the first and second prizes were awarded by the councillors to two of their own townsmen (the only two local architects competing) had they not seen the announcement in one of their city papers.

The amenities usually prevalent among business men seem to have been entirely ignored.

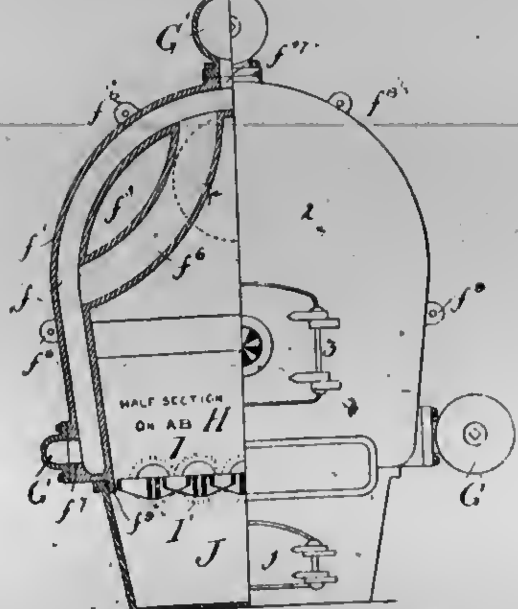
12th May, 1898. JUDEX.

Mr. C. B. Chappell, architect, Charlottetown, P.E.I., in renewing his subscription to the ARCHITECT AND BUILDER, writes: "I take three or four other architectural papers, but would not be without yours."

Hammers are represented on the monuments of Egypt twenty centuries before our era. They greatly resembled the hammers now in use, save that there were no claws on the back for the extraction of nails. The first hammer was undoubtedly a stone held in the hand. Claw hammers were invented some time during the Middle Ages. Illuminated manuscripts of the eleventh century represent carpenters with claw hammers. Hammers are of all sizes, from the dainty instruments used by the jeweller, which weigh less than ½ oz., to the gigantic hammers of shipbuilding establishments, some of which weigh as much as fifty tons, and have a falling force of from ninety to 100. Every trade has its own hammer and its own way of using it.

NEW HEATING FURNACE.

A PATENT has been granted to Mr. David W. Robb, of Amherst, N. S., for a new heating furnace, as shown herewith. The claim is in the combination of a series of upright tubular sections, having the contour of a horse-shoe, the inner walls of the tubes projecting and rounding inwardly from the edges, the sides of the arch provided with segment-shaped circulating tubes, a special front section of the same general character but without circulating tubes and having boxed enclosing spaces, fire-door, and boxed hearth plate extending across the front of the grate, a special fire



NEW HEATING FURNACE.

bridge section having circulating tubes and boxed fire bridge, a special section at the rear of the fire bridge section having the tubular boxing continued across the lower ends and having the circulating tubes replaced by a boxed deflector, a rear section having boxed rear enclosing spaces with smoke flue and soot holes, and the tubular boxing continued across its lower ends, an ash-pan forming part of the base and supporting the sections and a grate in said ash-pan. The circulating tubes are D shaped in cross-sections with the flat face turned outwards and continued to project beyond the tubular space to form rims, one of which is rabbeted to form joints, and tubular sections provided with segmental circulating tubes in the crown and with nozzles at the lower ends and the top of the crown. The inner wall of the tube resembles the elongated bottom of the letter U in cross-section, a square edged rim at one end of said wall projecting at a right angle to plane of said section, and a similar but rabbeted rim at opposite edge, with bolting logs on said rims and a segmental circulating tube in each side of crown, etc.

Oil must be used in the first coat of paint for brickwork, says the Painters' Magazine, for it is the oil which forms the material which binds the pigments together. Certainly brickwork must be perfectly dry when the paint is applied, for otherwise it would soon scale off.—If the proper precaution is observed in the work of painting this kind of work there will be little cause for complaint and the protection added to this kind of work by paint is almost as great as is the protection added to woodwork.

ILLUSTRATIONS.

A CORNER OF THE TORONTO HUNT CLUB.—DARLING & PEARSON, ARCHITECTS.

RESIDENCES FOR MISS MORRISON AT 34 AND 36 CARLTON STREET, TORONTO.—LANGLEY & LANGLEY, ARCHITECTS.

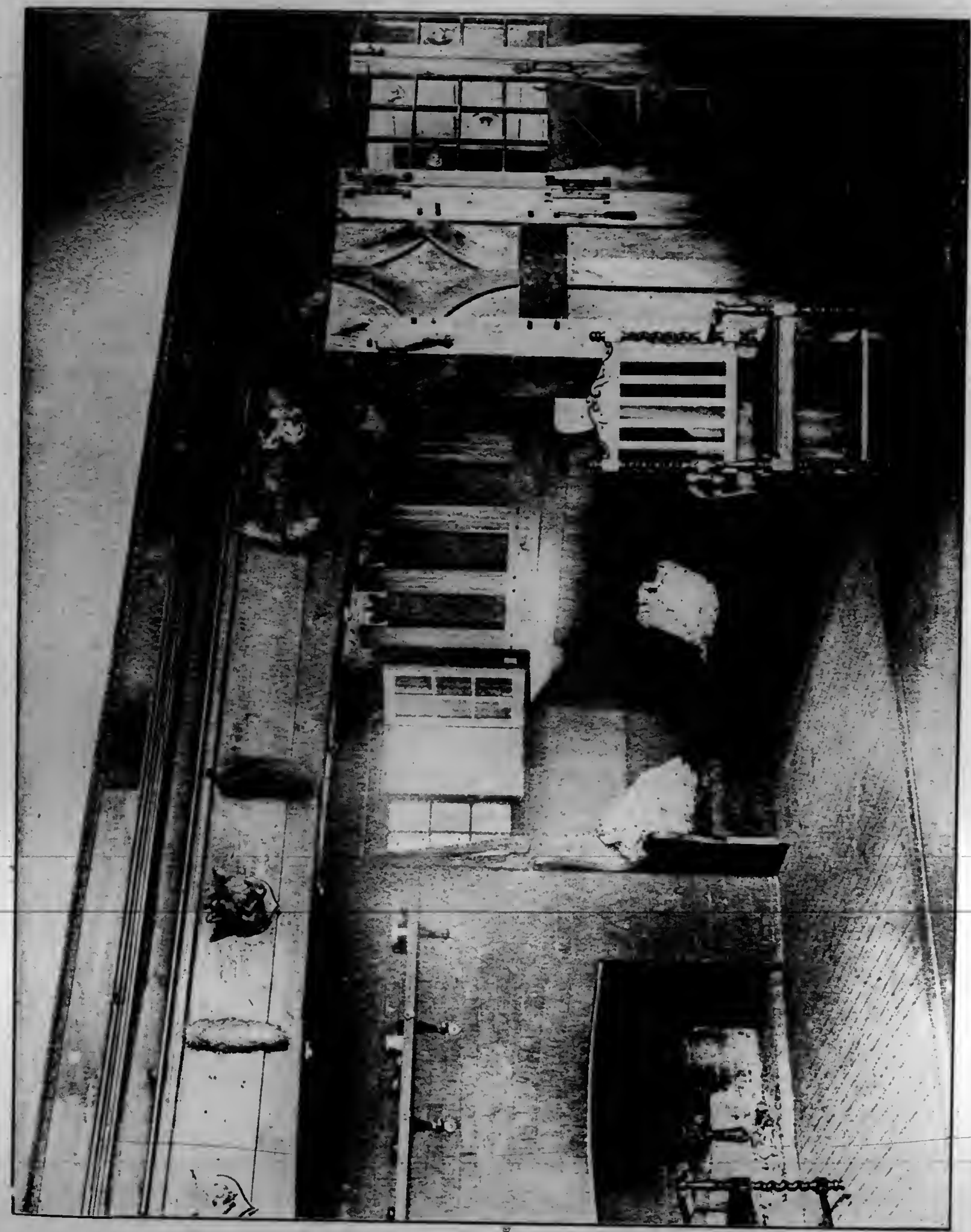
DESIGN PREPARED FOR THE TENTH ANNUAL COMPETITION OF THE ARCHITECTURAL LEAGUE OF NEW YORK; SUBJECT, ENTRANCE AND APPROACHES TO A TERMINAL RAILWAY STATION.—ARTHUR E. WELLS, ARCHITECT.

NORTH AMERICAN LIFE ASSURANCE COMPANY'S OFFICES, KING STREET, TORONTO, ERECTED FOR THE UNITED EMPIRE CLUB, 1875.—GRANT & DICK, ARCHITECTS. REMODELLED FOR THE N. A. L. A. CO., 1897.—LANGLEY & LANGLEY, ARCHITECTS.

The corrosion which takes place on the bottom of iron railings set in stonework with melted lead is, according to Professor J. M. Thomson, largely due to galvanic action, and the same action will exercise its influence in all cases where two different metals come in contact, unless that contact be as perfect as possible. But the action of acid vapors which are in the atmosphere of some towns on iron and zinc is considerable, especially when the metals are in the form of thin or perforated sheets and gauze. Professor Thomson observed the action of the air of Glasgow on a window blind of fine iron wire gauze during a period of about seven years. Although originally protected with lacquer, the lower portion of the blind in position opposite to where the window had been daily raised from its sash had been gradually eaten away. There is no doubt that such corrosive actions are assisted by the simultaneous process of oxidation, but there is, at the same time, evidence of the direct action of the acid vapors. The principal conditions under which lead fails are when it comes in contact with air, moisture and carbonic acid, more especially if organic acids derived from the soil or other sources are also present. In this case rapid corrosion may be expected, the action being similar to that already mentioned in the formation of the basic carbonate or white lead. This action being continuous in the presence of the chemical substances mentioned, the lead becomes finally entirely converted. The rusting of grey cast-iron is apparently slower than that of wrought iron, the different varieties corroding more quickly as the amount of carbon increases in the iron. A cement known under the name of "rust-joint cement" is employed in the junction of iron pipes. It is composed of 80 parts fine iron filings, 1 part of ammonium chloride, and 2 parts of sulphur made into a paste with water. When this is packed into the joint it sets into a hard cement, apparently produced by the formation of mixed oxide and sulphide of iron.

The well-known plumbing firm of Purdy, Mansell & Mashinter, Toronto, has been dissolved. The firm will in future be styled Purdy, Mansell & Co.

TESTING AND MIXING NEW TINTS.—The Farber Zietung describes a simple and quick manner by which the testing and mixing of a new tint may be accomplished. It is called the dry process, for it is simply by using gelatine or glass plates, which are dyed in all primary and secondary and some mixed colors for this purpose, with all the graduations from light to dark of each color. If two or three of these plates are put together and held against the light, the effect of the bend of colors can be seen immediately. Suitably arranged in a receptacle, these colored plates are the simplest and most convenient means of producing any desired color mixture and testing the effect at once.



A CORNER OF THE TORONTO HUNT CLUB.
DARLING & PEARSON, ARCHITECTS.

CANADIAN ARCHITECT AND BUILDER.

VOL. XI.—NO. 6. JUNE, 1898 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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American Institute of Architects.

PURSUANT to a decision reached at the convention of 1897, the lease has been taken of a building in Washington, which is to form the permanent headquarters of the American Institute of Architects. The opening ceremonies will take place in connection with the annual convention in November.

The Use of Shingles.

THE Timberman, of Chicago, contends that the quantity of shingles used nowadays is larger in proportion to the use of lumber than it ever was before. Two reasons are given for this—one that there is more brick used in the construction of buildings than formerly, without any corresponding decrease in the number of shingles required; and the other that the life of shingles at the present time is not as long as it used to be. It is not an easy matter to advance an apparently correct theory why the lifetime of shingles has become so much shorter. It is claimed by some to be due to the use of the steel wire nail, which will not resist the elements for more than about ten years, while the shingled roof was, in earlier days, expected to last twenty-five years.

The Dominion Heating and Supply Association.

THE article headed as above which appeared in the ARCHITECT AND BUILDER for May has given rise to considerable discussion among the members of the Dominion Plumbers' Association. The sentiments expressed therein by a member of the Dominion Heating and Plumbing Supply Association are clearly not entertained by the management, as witness their repudiation by the vice-president and a member of the Executive in our Correspondence Department. It may be well that we should state that the views were only those of an individual member of the association—not of the association. As such they were published. Hence they should not be looked on as being in any sense official, nor should an attempt be made to place responsibility for them on the shoulders of the officials of the Dominion Heating and Supply Association. It is a matter of regret to us that the publication of the article in question seems to have had a tendency to disturb the pleasant relations which have and should exist between the plumbers and supply companies.

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An Injustice to Contractors. IT seems to be the practice of some municipalities, when inviting tenders for public works and supplies, to allow outside contractors insufficient time in which to submit tenders. An example of this is afforded by the city of Montreal, which recently asked tenders for the supply of cast iron pipe, lumber, and other material. The first appearance of the advertisement in the daily press was on June 11th, and the date limit for the reception of tenders was June 14th, thus giving contractors only three days in which to tender. It is claimed by contractors that this time limit is insufficient and causes unnecessary hardship. It is not always convenient for a contractor to find the necessary time in which to figure within the brief period of three days, while the plans and specifications are not at all times available. So far as the city is concerned, there does not appear to be anything to lose by giving ample time for all intending contractors to submit tenders, while better results are almost certain to be obtained in consequence of greater competition.

Trade Openings. GUILLEMO Espinosa, a prominent importer of Venezuela and Quito Ecuador, states, in a recent letter to a New York export firm, that a demand exists in South America for sanitary apparatus, such as basins, closets, bath tubs, etc., and that a recent consignment from the United States found speedy sale. Canadian manufacturers of these lines of goods should place themselves in communication with the Canadian government trade representatives in South America, furnish them with catalogues, etc., descriptive of their goods, and endeavor to secure a share of the trade in this market. Notwithstanding the somewhat discouraging statement made by Sir Richard Cartwright in the Dominion Parliament the other day, regarding the possibilities of an extension of our trade with South America, the National Association of Manufacturers of the United States have recently opened a sample warehouse at Caracas, Venezuela, which is intended to serve as a permanent exhibition, and as a bureau of information, both for the Venezuelan buyers and the members of the Association, rather than as a store for the actual sale of goods; its aim is to bring American goods before the buyers in Venezuela more prominently than is possible by any other means now available.

Modern Street Pavements. THE construction of street pavements which shall meet all modern requirements has been the subject of much study and experiment in recent years. While much has been accomplished, there remain many unsolved phases of the problem. In Canada the powerful disintegrating action of frost is an added difficulty. The cedar block pavement so much in favor fifteen years ago is no longer employed to any extent. It is undoubtedly true that the defectiveness of this class of pavement in Canada was quite as much due to improper methods of construction as to unsuitability of material. In Chicago and other American cities where block pavements were laid on a plank and concrete foundation, they are declared to have given very satisfactory results. In Canada, asphalt, brick and macadam roadways are now the favorites. Asphalt, if properly put down, is probably the best material for streets, except those traversed by street car lines and subject to the heaviest traffic. Its cost, however, proves a hindrance to its general use. Properly manufactured vitrified brick makes a clean and durable pavement, easy to repair, and will, no doubt, come into use to a considerable extent. In Toronto its use on residential streets has been objected to on account of its noisiness. From observation we should say that there is ground for this objection, the importance of which appears to be becoming more generally recognized. A well constructed macadam roadway is durable and noiseless. It is, however, somewhat dusty, and on this account requires more frequent watering. This class of roadway requires to be well drained and otherwise skilfully constructed, otherwise the cost of repairs is likely to be large as compared with either asphalt or brick.

Present Day Architecture MR. James Hine, in an address delivered recently at the annual meeting of the Devon and Exeter Architectural Society, referred to the causes from which springs much of the unsatisfactory architecture of the present day. "Why was it," he said, "that in the more modern towns, fashionable and unfashionable, which had sprung up during the present century, the impress of architecture was so imperfect and unsatisfactory? Because, for the most part, they had not been the creation or work of architects. This had been a misfortune for the profession, but it had been a greater misfortune for the towns, and had been the occasion of numberless blots on the face of nature. Occasionally it had no doubt been possible to carry out in such new towns a well-considered and effective design; but one swallow did not make a summer, and one good building did not usually make a beautiful street. In an age like the present, when nearly everything pertaining to a building could be produced by machinery, there must necessarily follow great monotony and absence of artistic interest in the buildings largely composed of them. Trade catalogue architecture might be all very well from a strictly commercial and economical point of view, but the tendency of it was to destroy all individuality in a building and to drag architecture proper into oblivion. Buildings were being pulled down in all parts of England possessing historic interest and features of architectural beauty; were they to be supplanted by lifeless structures of this automatic type? This was a subject which demanded the consideration of all. Let them hope that in the coming century, as in all great periods of architecture, buildings might be more and more the reflex of the individual mind of the architect."

Rights of Workmen on Public Contracts. THE treatment accorded workmen employed on the construction of the Crow's Nest Pass railway, as per the recent report of a Parliamentary Commission, was of the most inhuman character. The charge is laid at the door of the contractors, their agents and sub-contractors, of having taken advantage of the workmen in every possible way. It is alleged that they were charged a regular amount per month for postage and medical attendance regardless of whether they wrote any letters or were in need of medical attention. It is likewise alleged that the camp was without sanitary provisions of any kind. When from this and other causes the workmen became ill, they are declared to have been cruelly neglected, and two young men from Nova Scotia, victims of diphtheria, are stated to have been allowed to die like dogs on the floor of a miserable hut. These particulars will suffice to show the scandalous treatment to which workmen can be subjected at the hands of unscrupulous contractors. All honor is due those members of Parliament who insisted on thorough enquiry being made into a condition of affairs, the existence of which is difficult of realization in a Christian land. One result of the revelations which have come to light in this case, should be the enactment of legislation compelling public contractors to properly house and feed their workmen, and provide for them proper medical treatment. To this end means should be provided for a fair adjustment of disputes between contractors and workmen, and to compel both to fulfil their pledges of agreement.

Compensation for Accidents to Workmen. GREAT Britain has fallen into line with Germany, Austria and Denmark, in recognizing the principle that workmen who suffer injury by reason of accidents are entitled to receive compensation from their employers. In furtherance of this principle the British Workman's Compensation Act received the assent of the British Parliament, and will go into operation on the first of July next. Under this act compensation must be granted by employers to workmen who may be disabled or killed while employed in mines, quarries, engineering works, factories, railways and building operations where machinery is employed or the scaffolding is over 30 feet in height. The act provides in the event of total disablement that the workman is to be paid one-half of his regular weekly wages so long as he shall live, but this allowance is not to exceed one pound per week. If a workman is killed in an accident, leaving no heirs, the sum of $48.66 only is to be paid by his employer for funeral expenses. If he has heirs they are to receive one-half of three years' wages, the minimum amount to be $750 and the maximum $1,460. It is unquestionably right that compensation should be made for injuries resulting to workmen through lack of proper precautions being taken by employer for their safety, but in view of the well-known carelessness of many workmen, it does not seem just that the whole responsibility should be thrown on the shoulders of the employers. As the funds from which compensation is to be provided must be furnished wholly by the employers, elaborate calculations are being made by insurance experts and others interested as to the proportion of accidents to workmen and the cost of insurance against same.

Method of Obtaining Tenders for Glass Work. OUR attention has been called to the method which obtains among architects in Canada of letting contracts for stained glass work in conjunction with painting. In some instances, such as the erection of churches, separate tenders are invited direct from the glass works, but this is not the usual course. Although some have recognized the advantage of taking separate tenders on stained glass, it is said that, as a rule, architects in this country have been slow to adopt the practice which is followed in European countries and the United States. The present method is claimed to be unfair alike to the client, architect and stained glass contractor. For example, the painter submits a tender for certain work, including stained glass at, say, $1.50 per foot, which is accepted by the architect. The painter retains from twenty-five to fifty per cent. for his commission. The balance goes to the stained glass manufacturer, who is expected by the architect to furnish goods worth $1.50 per foot. There are said to be instances on record where the glass contract has been turned over from the painter to a wholesale dealer, who would supply the plain glass from his stock, and place the balance of the contract with the stained glass manufacturer, thus necessitating two commissions, and reducing the price paid for the glass far below that which the work should command. Were separate tenders taken for glass, it is contended that the work could be done at less cost, and that better value would be given. We would be pleased to give the necessary space for a fair discussion of this question, and to learn the views of the trade on the subject.

ILLUSTRATIONS.

DESIGN FOR COTTAGE ARTHUR E. WELLS, ARCHITECT.

RESIDENCE AT LONDON, ONT.—MOORE & HENRY, ARCHITECTS.

SKETCH FOR CHURCH DOOR.—J. A. RADFORD, ARCHITECT, TORONTO.

DESIGN FOR SCHOOL.—W. A. EDWARDS, ARCHITECT, HAMILTON, ONT.

DOORWAY ON VIA DI S. STEFANO DEL CACCO, ROME.—MEASURED AND DRAWN BY MR. J. C. B. HORWOOD.

BY THE WAY.

AN antiquated rule which ought long ago to have been abolished provides that all petitions and communications submitted to the British House of Commons and official departments of the government must be on written or lithographic form. A typewritten memorial recently introduced by a member to the Sacred interior of St. Stephen's, was declined by the Speaker on the ground that it was an infringement of the dignity of the House; his contention being that type-writing was not manuscript or lithography, although he admitted that the rule was laid down before the invention of the type-writer.

× × ×

A LONDON newspaper takes a shy at the methods of the Jerry builders in this fashion:

BUILDING IN TOPSYTURVEYDOM.

It was a lonely building,
  Though it ended in a loss,
For every one was foreman
  And every one was boss.
And each one built his portion
  Just according to his mind,
And altered the construction
  If he chanced to feel inclined.

The girders were short measure,
  Which was quite a trifling thing;
And they hadn't any rivets,
  So they tied them up with string.
But it must be owned the concrete
  Was indubitably poor,
Which was proved by a mechanic
  Falling through a fireproof floor.

And the bricks were rather crumbly
  For the strain they had to bear,
But they wouldn't drop to pieces
  If you handled them with care.
Oh, it was a lovely building,
  From the point of view of spoof.
And it held together bravely
  Till a fly sat on the roof.

The death was recently announced at San Francisco of Mr. Augustus Laver, who designed the Western Departmental Block at Ottawa, and was afterwards associated with Mr. Thos. Fuller, late chief architect of the Dominion Public Works Department, in the construction of the Capitol at Albany, N. Y., Mr. Fuller's design for which was accepted and awarded first prize. Mr. Fuller having subsequently obtained first prize for a city hall for San Francisco, and being unable to leave Albany, Mr. Laver took charge of the work, and afterwards made that city his home. While there he erected many important buildings, among others the palatial residence of the Floods, the furniture for which alone cost $100,000. Mr. Fuller writes us that Mr. Laver was "a man high in his profession, and an old and dear friend."

CORRESPONDENCE.

Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

A CORRECTION.

QUEBEC, May 28, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Some of the information given you regarding the purpose in the formation of the Dominion Plumbing and Heating Supply Association is erroneous, and I think it would be well before publishing these statements to have them corroborated by some of the officers residing in your city. While I have no doubt you inserted the item I allude to with the best intentions yet it is likely to do harm to those whom you most desire to benefit. The formation of our association was brought about principally at the request of the Master Plumbers' Association of Canada, they deeming it advisable that an association of the leading jobbers and supply men who would work in harmony with them, would be of great benefit to the master plumbers.

This then is the object for which this association is formed, and not as your correspondent has informed you, to work antagonistically to that of the master plumbers.

Nothing whatever of what your correspondent gave you was debated or brought before our association, and for this reason I think in future it would be well to see that the truth is stated when these items are published.

Thanking you in advance for the publishing of this letter in your columns, I remain

Yours truly,

W. H. WIGGS,

2nd Vice-President Dominion Plumbing and Heating Supply Association.

DOMINION PLUMBING AND HEATING SUPPLY ASSOCIATION.

TORONTO, May 31st, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—On page 94 of your journal, THE CANADIAN ARCHITECT AND BUILDER for May, there is an article under the heading of "Dominion Plumbing and Heating Supply Association" to which my attention has been called from several different sources, and as I observe that my name appears in the article as a member of the executive (and this is the first intimation I have had of the appointment) I seem to have been a mark for some of my friends in the plumbing and heating business upon whom to lay the blame for having written the article.

When my attention was first called to the article I did not pay much attention to it, as I concluded that the fact of the blame being put off on me was merely being done for pastime on the part of some mischevious competitor who desired to make capital at my company's expense, but as time rolled on the blame thrown upon me has grown to an enormous size, and for this reason I feel that it is my duty, not to myself, but in justice to the company of which I have the honor to be the chief executive officer, to say that the article when it was first shown to me in print was the first knowledge that I had of it either directly or indirectly. I did not write the article; I did not inspire it; I was not consulted about it; and more than this I did not attend the meeting which is referred to at Montreal, so that I could have no knowledge whatever of any of its proceedings, and have not to my knowledge even received a copy of the minutes of that meeting. I had an invitation to attend it and fully expected to be in Montreal, but unfortunately I was absent from home at the time.

I would not have taken the trouble to direct your attention to the letter, or to have repudiated any knowledge or connection with it had it not been that the Plumbers' Association of Canada are a most estimable body of men, and further their executive officers in Toronto, and some of their most prominent members throughout the province, have expressed themselves as feeling very sore at the article having appeared, and because I am inclined to believe that some uncharitable competitors or parties engaged in the same class of business as that in which our company are engaged are deliberately making capital out of this and blaming the wrong party, it is only fair that I should set myself and the Toronto Radiator Company in the proper light.

In conclusion I may add that the Toronto Radiator Company have been one of the strongest fighters in support of the rules laid down by the National Association of Master Plumbers of Canada. I believe that they have done more for the protection of the legitimate plumber than any other firm doing the same class of business in the Dominion. They have stood idly by and let the trade go past them in order to protect the plumber, as we believe that the tradesmen must be protected, otherwise they cannot live.

I hope now that the man who was so free to give all the information about what is said not to have happened, will have backbone enough to step out to the front that we may see him.

Yours respectfully,

JNO. M. TAYLOR,

Managing Director of the Toronto Radiator Manufacturing Co., Ltd,

A SECOND REPLY TO MR. WELLS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Mr. Wells wrote a letter in your March number saying that the Ontario Association of Architects is wrong to advocate education for architects when what is wanted is inspection of buildings.

I replied in your April number that the Association advocates both inspection and education and is taking as much pains about one as the other.

Nevertheless we have Mr. Wells again in the May number still crying for inspection and treating me with much bitterness as an under-valuer of inspection. I do not consider that fair correspondence. One who reads only Mr. Well's last letter, as I dare say some of your subscribers have, would not imagine that Mr. Wells' correspondent had replied in effect: "The Association which you attack for devoting itself to the education of architects instead of to advocating the inspection of buildings is not, as you suppose, neglecting to do what it can to procure good building laws and inspection of buildings; on the contrary it has been for some time taking a great deal of pains about these things and would be glad to have your assistance. Indeed the only point of difference between us is that you think the inspection of buildings is all that is necessary, while the Association (and the legislators who founded the Association) think it important to get to the root of the matter by working for the education of architects who plan the buildings; and they think that this is the more important work in the same ratio as prevention is more important than cure."

Surely that is sufficient answer to prevent a return to the question in precisely the same manner as before.

In the remainder of his letter Mr. Wells hints disapproval of some characteristic or characteristics of the Association, but does not state what they are with that straightforwardness to which I think a well meaning body is entitled. If he will say straight out what harm the Association (to which, by the way, he owes much in the way of education) is doing him or any other young man, I shall be glad to answer his objections if I can. If there is no answer I shall say so. I (nor I think the promoters of the Association) have no interest in supporting the Association except as a means of doing good.

I only beg to suggest that a copy of Mr. Well's letter be sent to me that I may answer it before you go to press, so that his letter and my reply may be read together on the same page.

Yours truly,

W. A. LANGTON.

Mr. Geo. Anderson, Commissioner to Japan, in his report to the Dominion government, says: Shingles are used extensively for roofing purposes, being nailed on the sheeting and then covered with mortar, tiles being put on over all. For this purpose No. 2 and 3 quality should find a very large sale. They are also used in the northern part of the Main Island and in Hokkaido, the Northern Island, in the same way as in our own country, with this difference, that bamboo strips are put across the row, the strips being held on by large flat stones, instead of each shingle being nailed. A better quality would be required for this latter purpose.

WIRE STONE SAWS.—In the French quarries at St. Triphon stone is sawed with steel wire cables moistened with wet sand, and passing in an endless rope over a series of pulleys. The wire, which runs from 1,000 to 1,200 feet per minute, is charged as it enters the cut with a jet of water and silicious sand, which forms the cutting material. A running cable of 500 feet can make a cut 100 feet long. To remove a ledge, pits three feet in diameter are dug to the depth of the desired cut and the stone sawed vertically in slabs to the bottom, being then easily split off by wedges. The slabs are removed by an electric travelling crane and sawed to any desired size.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

LECTURE BY PROF. CAPPER ON "ANCIENT ROME."

THE course of public lectures organized by the Province of Quebec Association of Architects for the winter of 1897-1898, comprised three lectures, delivered by Professors Adams, Colby and Capper, all of McGill University. As last year, the lectures were arranged to fall in with the course promoted by the Art Association, and were delivered in the large hall of the latter society in Phillips' Square. These lectures are evidently much appreciated by the public of Montreal, all being exceedingly well attended. The last of the series was delivered by Mr. S. H. Capper, McDonald Professor of Architecture at McGill University, on March 29th to an overflowing audience, under the chairmanship of the Rev. J. Edgar Hill. By the courtesy of the lecturer the following abstract has been placed at our disposal:

Professor Capper took as his subject "Ancient Rome," the lecture being illustrated by a fine series of about fifty lantern slides. The lecturer made an appreciative reference to Prof. Adams' lecture on "Pompeii" (the first of the course), pointing out that in Pompeii, as nowhere else, the domestic architecture of the ancient classical world could be studied in wonderfully complete preservation and detail. At Rome, on the other hand, examples of domestic architecture were almost wholly lacking. The remains that had survived the ravages of time and violence were those of public and imperial architecture—the great buildings of the metropolis of the world; but the private dwellings of the Roman citizen had wholly disappeared. One house only remained in a tolerably perfect condition, the so-called "House of Livia"—really, in all probability, the house of Germanicus—discovered in 1869 on the Palatine Hill.

Into the scope of a single lecture it of course would be vain to attempt to condense the vast field of the archæology of Ancient Rome; the lecturer therefore confined himself to a survey of the Palatine Hill and its immediate surroundings, from the Coliseum to the Forum Romanum. In so doing, he made ample acknowledgement to the unremitting and splendidly fruitful labors of Signor Rudolfo Lanciani, undoubtedly the foremost living authority, to whose published works the audience were referred as the repositories of the fullest and most recent knowledge on the subject.

The original settlement on the two-peaked Palatine Hill was first dealt with, and its primitive features were noted. The earliest Romans, or "dwellers in the river-town" (as the name has been interpreted), were probably refugees from the Alban hills whose homes had been overwhelmed by volcanic eruptions much in the same way as, centuries later, the citizens of Pompeii and Herculaneum were overwhelmed in historic times. This earliest settlement was of a pastoral people, who had ample room on the easily defended hill-top for housing both themselves and their flocks; the surrounding valleys were largely marshes, liable, as down to quite recent years, to be submerged when the overflowing Tiber rolled down in heavy flood to the sea, which then was several miles nearer to Rome than is now the case. Passing from these early and prehistoric times, still brought home to us by tradition and myth (in which historical facts can yet be discerned), the lecturer took up the existing remains of imperial architecture, which occupy, though in fragmentary ruins, the same site, and described, with the help of plans and views shown by lime light, the palaces of the Caesars, from the early and modest house of the Emperor Augustus to the later and much more magnificent buildings carried out through several centuries by his successors. Of the earlier buildings of imperial times, the house of Germanicus (to which reference has already been made) is the best preserved. It is a comparatively small dwelling, and was probably spared throughout the succeeding alterations and additions to the imperial residences owing to the extreme and affectionate veneration in which the memory of Germanicus was held. The vast buildings of Tiberius and Caligula, of which only the substructures remain, were next traced; in the long gallery or crypto-porticus of the latter the young Emperor who built it was murdered in the dreadful tragedy so thrillingly told by the historian Tacitus, the murderers actually escaping by way of the house of Germanicus adjacent. The Domus Gelotiana—or Paedagoguim—was also added by Caligula, who bought it because of its proximity to the Circus Maximus and the jockeys' quarters there, the young prince being as much addicted to the racecourse as any modern English aristocrat or American millionnaire. In this building were found some of the most interesting graffiti—or mural scribblings—extant, including one believed to represent in caricature the Crucifixion.

The vast public and reception halls of the imperial palace added by the Flavian Emperors were next traced. To carry these out the entire ravine or valley separating the two peaks of the Palatine was filled with huge substructures, and on the gigantic platform thus made the magnificent state apartments were built.

Leaving the Palatine Hill, after reference to the later buildings of Sevetus, the lecturer took up the grand and world-famous buildings occupying the valley that bounds it on the north-east. The Arch of Constantine and the Coliseum, the Arch of Titus with its sculptures, the Basilica of Maxentius and Constantine, and the Temple and Cloister of the Vestal Virgins were successively reviewed, all being very fully illustrated and discussed, both from an archæological and a more especially architectural point of view, this concluding portion of the lecture thus embracing the buildings of the Sacra Via, perhaps the most famous street of the ancient world, until at the northern spur of the Palatine it opens on to the Forum Romanum, the centre and heart of Ancient Rome.

MONTREAL BUILDERS' EXCHANGE.

AT the general meeting of the Exchange held on the 3rd inst., there was a large attendance of leading contractors. The principal feature of the meeting was an animated discussion of the employment of foreign architects and contractors by public companies and institutions of the city, to the detriment of local interests. The numerous handsome and substantially built buildings erected by local architects and contractors in this city were pointed to as evidence that there is no lack of ability on the part of local architects and contractors to meet satisfactorily all requirements in this direction, and that this fact, combined with loyalty to the city's interests, should restrain these public corporations from employing foreigners in preference to those on whose shoulders rest the responsibilities of citizenship. The following resolution referring to this matter was unanimously adopted, accompanied by a vote of thanks to the city council for having stipulated that in the erection of the new G. T. R. offices, only local architects and contractors should be emloyed.

"Whereas, according to a practice of recent introduction, both on the part of some architects and proprietors, and especially of public companies, of bringing in aliens and non residents for the carrying out of work in the building line that our own builders and contractors are fully competent to execute, the members of the Builders' Exchange of Montreal hereby strongly and emphatically protest against the countenance of this unpatriotic, unfair, and injurious practice, and request all those who have the interests of our city at heart to use their influence to put a stop to what has, in the past, worked serious injury to our city and citizens. Especially is such action desirable in view of the fact that the contractors in the province of Quebec have to carry responsibilities for a length of time not called for in any other country that we know of, and which necessarily cannot be enforced against aliens.

Resolved that a copy of this resolution be sent to the Press the Board of Trade, Architects' Association, and various public institutions.

We have the honor to remain

Yours respectfully,

(Signed) { JAMES SIMPSON, President.
GEORGE J. SHEPPARD, Secretary.

MASTER PLASTERERS' ASSOCIATION.

THIS Association has recently been thoroughly reorganized and is now on a good working basis. Efforts will be made to protect the interests of the members against incompetent jobbers, and place plastering in its proper rank among the building trades.

LIBERAL CONTRACTORS' CLUB.

AT a meeting held in the new club rooms, 90 St. James street, on the 7th inst., the president, Mr. Sauvageau, being in the chair, a discussion took place on the desirability of having the provincial law amended so as to reduce the period for which contractors may be held responsible for the safety of their buildings, from ten to five years. The discussion was participated in by Hon. Mr. Dodidoux, Mr. Louis Gonne, M.P., C. A. Chenevert, M.P. for Berthier, J. O. Lamert, Mr. J. P. Blosgraw, G. I. Leveille, Joseph Beland, Pierre Ricotte and Joseph Lamarche. This is said to be the only province or country in which the law places such a responsibility upon contractors.

DEGREE CONFERRED.

IN recognition of his services in giving to the engineering students a course of lectures on the actual design of bridges, Mr. Ira G. Hedrick has received from McGill University the degree of B.A. Sc.

Messrs. Mesnard & Daoust, architects, have dissolved partnership.

SUGGESTIONS ON HOUSE PLANNING.*

By Grant Helliwell.

Among the almost innumerable acquirements of the capable architect, none are more important than skill in the art of house-planning. There are those who will not admit that the term "art" is applicable to a subject which they consider most prosaic and commonplace. While they cannot deny that planning is a necessary part of an architect's work, they would relegate it to an inferior and subordinate place—not worthy, in fact, to engage the highest faculties of an artist.

Such views as these are not only absolutely wrong, but injurious to the best interests of architecture, tending to derogate to ordinary utilitarianism that which is an integral part of the art—the very root from which emanates the completed structure, and to which it is as indissolubly joined as the skeleton of man to the outward form of flesh. It would not be difficult to show that planning presents fully as wide a field as exterior design for the exercise of the imagination and the employment of those creative faculties which alone can produce the beautiful. Moreover, history and experience both go to prove that all structures of acknowledged architectural merit exhibit the same skilful design in that part of the work which comes directly within the scope of planning as in the mere external shell, intrinsically beautiful as the latter may be.

Another proof of the importance of planning, and especially of house-planning, is the indisputable fact that in no other study engaging the attention of man does the comfort, convenience and happiness of his fellow creatures so much depend.

It is true that the most notable structures, both of our own and bygone ages, have been, not the dwellings of men, but buildings devoted to purposes of worship, of business or of recreation. The fact still remains, however, that man's habitation is his first and greatest need, and that it should be the province of the architect to so construct and beautify the home that it shall afford its inmates not only needful shelter for the body, but also contribute largely to the enjoyment of man's intellectual, social and æsthetic functions.

Planning, we thus see, enters into vital consideration with every class of building, but the scope of this paper does not go beyond that of the house, and even here the field is so broad that it would be impossible within its necessarily brief limits to attempt to cover all the ground. Hence the subject House-Planning has been qualified by the word "suggestions."

In his study to obtain the best results, in overcoming difficulties, many of which at first sight appear insurmountable, in arranging and re-arranging, the architect finds one of the most charming occupations of his professional life. Let it be laid down as an unmovable principle that no plan shall be allowed to pass until the best possible arrangement has been obtained. As a mistake here is fatal to success, the architect should not begrudge any amount of care and study on this part of his work; and as an encouragement thereto it may be said that there is scarcely any difficulty which will not yield to such treatment. Moreover, what may appear small details, such as the arrangement of each space both in regard to itself and its relation to other parts, the position of doors, windows and fireplaces, the provision of sufficient wall space, etc., are all most important, and affect in no slight degree the comfortable and economical working of an establishment. The benediction which will descend on the head of the architect who has paid full attention to these matters will be ample reward for the time and trouble expended.

There are certain elementary axioms which apply more or less to all house planning. Although well known to every thorough student of the art, they are of such importance as to justify their repetition here. These are ASPECT—with which may be coupled PROSPECT—SIMPLICITY and ECONOMY. There have been and are planners of houses who scarcely know the meaning of the word "aspect," and yet what one of us whom circumstances may have compelled to live in houses into the living rooms of which God's blessed sunshine never penetrates, but inwardly rebels against the fate which has barred him out from that most delightful and health-giving provision of nature. Most of us are familiar with the aspect compass, a device for showing the range of the sun's rays throughout the year, enabling one to determine how many hours or parts of an hour of sunshine any window will admit to the room it lights. It is true that with city houses the question of aspect is usually more or less restricted, yet even here the skilful architect will, by such expedients as projected bays, recessed courts, etc., accomplish much; while, in the case of suburban or country houses, every room may and should have some direct sunlight. While studying the problem of aspect the thoughtful architect will be fully alive to the advantages and possibilities of prospect—by no means a small factor in the pleasure of the house's inmates. In the country fine prospects are nearly always attainable, and not infrequently even in the city.

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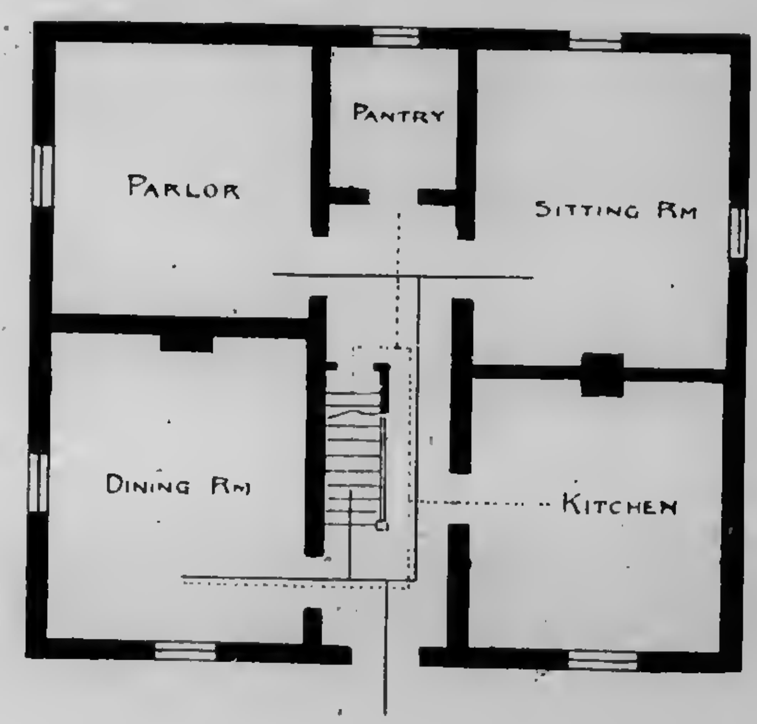


FIG 1

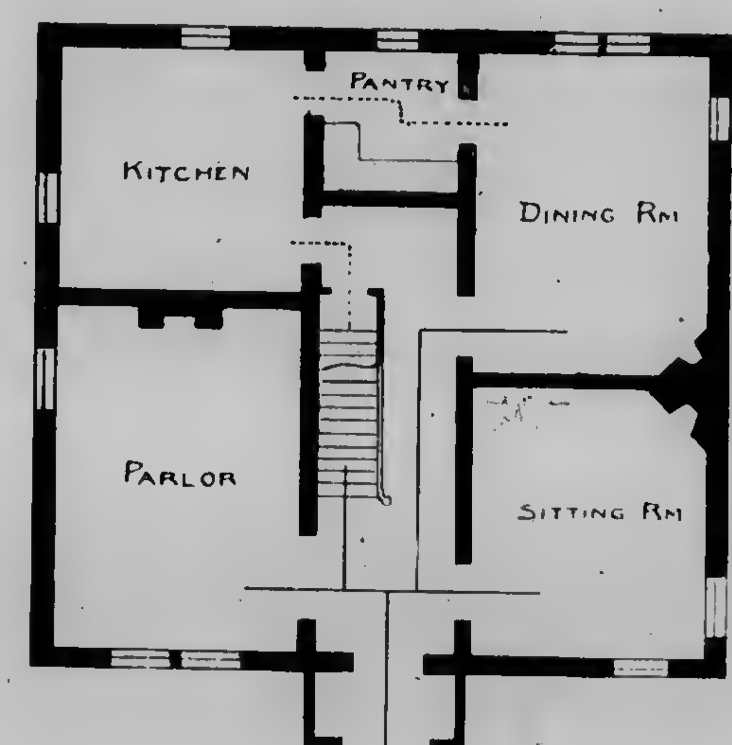


FIG 2

In the designing of every plan, no rule is more important to observe than that of simplicity. It is an unerring test of excellence. True, a plan may be simple without being good, but it is not too much to assert that no plan can be good without being simple. This point we shall endeavor to illustrate more clearly when going into the analysis of a plan.

Again, all planning should be based on the sound principles of economy, both as regards space and material. Rooms, halls, pantries, it matters not what—each has a proper size—to go beyond which involves, not only unnecessary and useless outlay at the start, but is a perpetual source of pecuniary loss, as well, perhaps, as of physical strength.

Houses are of two broad types—town and suburban. The chief difference between these, so far as plan is concerned, is that in the town house there are usually certain limitations of site which necessitate a plan of more or less rectangular outline and which admit of windows and doors on only certain sides. With the exception of possibly greater freedom from social restrictions and the use of verandahs and such like, the domestic habits of people living in the country are almost identical with those of the inmates of town houses. The main principles of house planning will, therefore, apply in both cases. We shall first consider these principles and then seek to apply them by way of illustration to a few plans of houses of either type.

In the study of house planning the writer has found Prof. Osborne's excellent work on this subject most helpful, and many of the points presented in this paper, as well as several of the diagrams, have been taken from his book.

In analyzing a plan we find, obviously two main divisions, i.e., rooms and passages. These are further subdivided, as shown in the accompanying diagrams.

- Rooms
  - Family
    - Public: Reception Room. Parlor. Drawing Room. Library. Dining Room. Billiard Room.
    - Private: Study. Bedrooms. Dressing Rooms. Bath Rooms.
  - Servants
    - Service: Kitchen. Pantries. Store Rooms. Laundry, &c., &c.
    - Private: Servants' Hall. " Bedrooms. " Bath Rooms.

- Passages
  - Family
    - Public: Entrances. Vestibule. Main Hall.
    - Private: Side Halls.
  - Servants
    - Service: Between Family and Service Rooms.
    - Private: Between Servants' Rooms or Servants' and Service Rooms.

A critical examination of any plan shows that the passages or thoroughfares of a house form the backbone, as it were, of the whole scheme. Let us now apply the principle of analysis. First take the plan of a simple four-roomed house, consisting of parlor, dining room, sitting room and kitchen. Arrange these as in Fig. 1. Now trace on this plan lines showing the natural thoroughfares between these apartments. What is the result? A servant going to the pantry runs into a guest coming from the parlor; another, entering the dining room, comes into collision with a member of the family at the foot of the stairs. The lines of passage cross and tangle. Now arrange rooms as in Fig. 2, and trace passages as before. Here we have an arrangement at

FIG. 3

once orderly and convenient. The servants easily accomplish the work of the house without interfering with the movements of the family, who, on their part, can enjoy comfort and quiet.

Apply the same test to a more extensive plan. Figures 3 and 4 represent a large house of seven rooms on the ground floor. In Fig. 3 we have a dining room shut out from the pleasant rays of the morning sun, but fully exposed to its scorching heat at the evening dining hour. The library, with door nearest the entrance, lacks the retirement desirable for that room. Visitors shown to the reception room have a full view of the former and its occupants. The lines showing passage-ways conflict, especially in the rear hall, where guests, family and servants are mixed up in hopeless confusion and under most embarrassing circumstances. In Fig. 4 all this is different. The lines of passage are direct and distinct from each other. The whole arrangement is harmonious and at the same time remarkably simple—a large square hall, with the principal rooms grouped about it, and one short hall to the serving offices. Notice too that the rooms are properly placed, not only with regard to aspect, but to comfort and propriety as well. One can readily picture the beautiful and im-

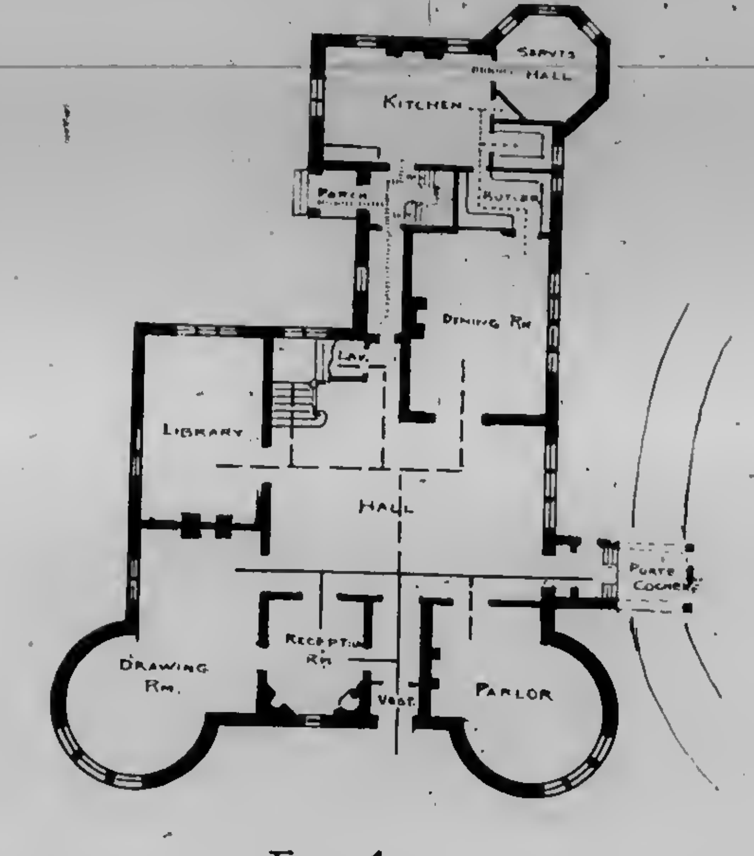


FIG. 4.

posing effect of such a hall, compared with which the interior of Fig. 3 appears most commonplace.

The same method of analysis applied to the upper floors of a dwelling will clearly reveal its excellencies and defects.

It is not enough, however, that the rooms and passages should be arranged in the proper relationship to each other. Each individual apartment and passage may and should be planned with regard to its specific use and purpose. The requirements of a drawing room are quite different to those of the library, and a room that would make an admirable kitchen would be most unsuitable for a dining room. The passages, too, demand a very different treatment according as they are to serve a public or private purpose. Time will not permit even a brief examination of the main requirements of all the rooms and passages of a house, but it may not be amiss to refer to a few of the more important points applicable to rooms that even the simplest house must contain.

First, the Entrance.—This consists properly of three parts—porch, vestibule and hall. The porch may range from the spacious and imposing adjunct of the mansion, with its porte cochere, down to the simple hood over the door; but no entrance should be without a feature which is necessary both for the purpose of emphasizing the approach and of sheltering the waiting guest. It is important that the entrance does not have a north or west aspect, but if that is unavoidable, so arrange the porch as to break the the force of the wind from those quarters. If a carriage porch be provided, see that it does not interfere with the approach of those on foot. In cold climates such as ours vestibules are a necessity. One sometimes sees these so small that the door to hall must be opened before the outer one can be closed after the incomer. The hall, as we have already seen, is an exceedingly important factor in the plan. It opens up the whole scheme, and usually contains the main staircase. Specially avoid a long, narrow effect. Often it can be so arranged that a portion may, by a judicious placing of the doors, be kept free from traffic and form a useful apartment. The stairs are better kept well away from the entrance, not only because more convenient there, but the appearance is much better, and the upper part of the house is not thereby exposed to view.

No room in the house is more important than the dining room. East to south aspect is best; or, if there is a breakfast room, it may be placed to the north. In size, a width of eleven feet is the least that will allow of passage behind those seated at the table, and this makes no provision for furniture; thirteen feet had better be regarded as a minimum in all but very small houses, with a

* Paper read before the Toronto Chapter of Architects.

Explanatory Note:

——— Public Family Passage. - - - - - Servants' Service Passage.
— — — Private " " ||||||||| " Private "

length of not less than seventeen feet. It is most desirable that the position of the dining room should be retired from the entrance, although we constantly see this rule disregarded. End light is best, but it should be diffused; shadows in a dining room are to be avoided. The fire-place is best located in the end opposite door. Easy access to the culinary department, yet distinctly separated from the family thoroughfare, is a prime necessity. At the same time direct communication with the kitchen is not allowable, nor is it advisable even that only one wall should

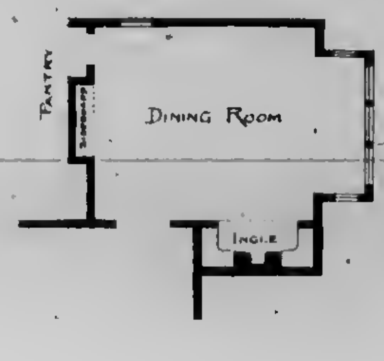


FIG. 5.

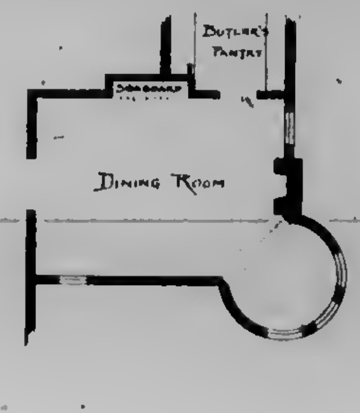


FIG. 6.

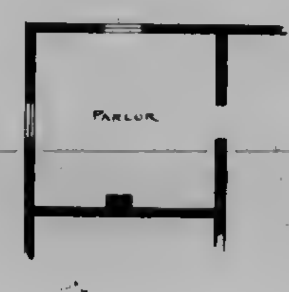


FIG. 7.

FIG. 8.

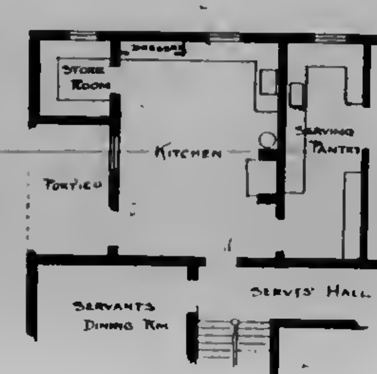


FIG. 9.

separate the two rooms, but in the case of small houses this cannot often be avoided. Figs. 5 and 6 are suggested as good plans for dining rooms.

The drawing room in large houses may be of oblong shape, but if the area does not exceed 230 sq. ft., it had better approach a square. In either event, however, the walls should be broken by bays, recesses or ingles, which, in the case of small rooms, invariably look better when forming part of the room without the intervention of an arch. The cheerfulness of the room is greatly enhanced by a second door, not to speak of the advantages in the entertainment of guests thereby gained. Figs. 7 and 8 show how a few trifling changes, such as altering the positions of doors and windows, will transform a most uncomfortable and disagreeable room into a comparatively attractive one.

Both library and sitting room are of a semi-private character, and should not be placed too near entrance. If the former is to be used chiefly by a student, and not for a general family reading room, it should be well isolated. As to aspect, south is best for a sitting room, while with the library this is not so important, provided, of course, that a good light is always secured.

There are many details about the kitchen requiring careful attention. Briefly, the points to be seen to are, a thorough yet

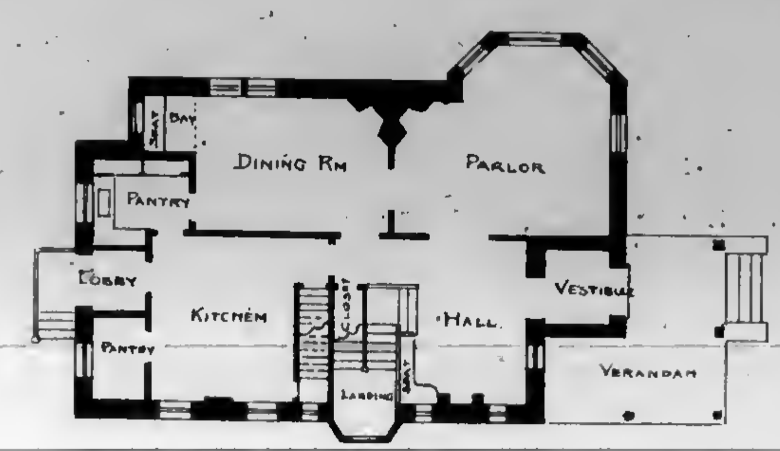


FIG. 10.

convenient separation from the family rooms and passages, good light (preferably from windows on different sides), space for sink, dresser and table. These articles should be grouped together and out of the way of through traffic Fig. 9 is offered as a fair solution of the kitchen problem.

Of the many other important rooms we cannot now speak, except to refer for a moment to the bedroom. It would seem hardly necessary to say that the position of the bed should receive special attention, but experience shows the contrary. It ought to be shielded from draft, not directly opposite the light, nor in view from the hall when the door is open. The bureau or dressing table should be well lighted, and the washstand in an inconspicuous place.

We have now concluded the analysis of a plan, first in its general aspect, and secondly in the details of the separate rooms. The examples we have taken thus far by way of illustration have been of the suburban type, or at least of town houses of the detached class. Fig. 10 shows a plan for a small house of the class most commonly called for, as adapted to either town or suburban lots. Fig. 11 is the plan of a city house for a 50 ft. lot. Both are given as exemplifying in a fair degree the principles already laid down.

It only remains now that we should briefly consider the city house of the kind usually understood by that term, viz., the house having only front and rear light, or, as in the case of a corner lot, on a third side as well. These changed conditions naturally call for a very different treatment of the plan. Owing to the possibility of lighting only a limited number of rooms on each floor, additional stories are necessary, and three, four and even five flats are often seen.

The old-fashioned house of this type was planned with two large rooms connected by folding or sliding doors, and a long narrow hall on one side containing the stairs, which rose in one straight flight to the upper floor. At the end of the hall, opposite to the entrance, was usually a narrow room containing the servants' stairs and a dumb waiter for connecting the basement, where the kitchen offices were located, with the floors above. The first modification of this plan was to build a narrow wing or extension at rear, which, occupying in width only a portion of the lot, could be lighted from the side and still admit end light to the main build-

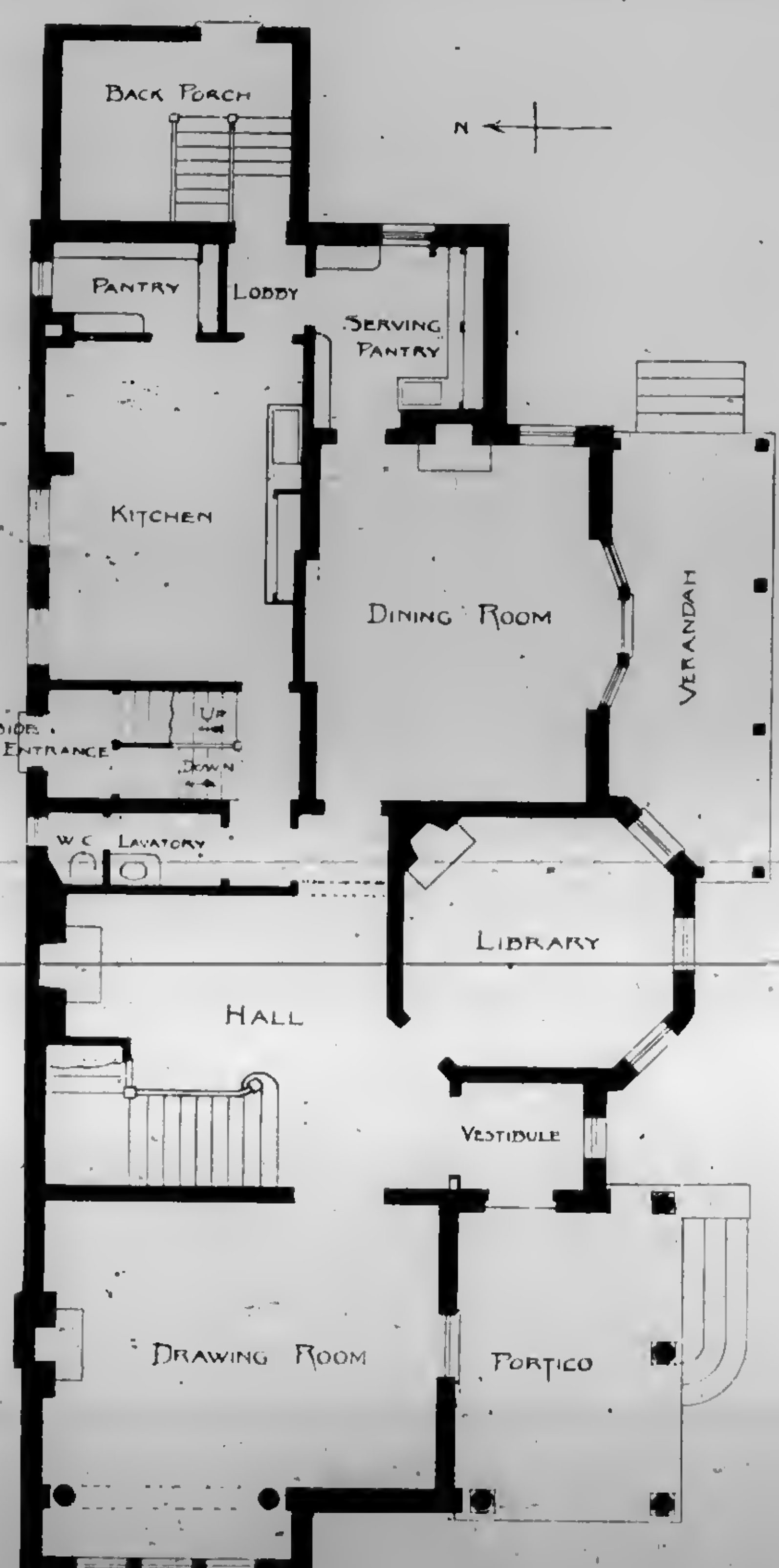


FIG. 11.

ing. The long, narrow hall was next attacked. A side hall of good width was placed across the house between the large front and rear rooms, and in it the stairs were placed. This was a decided improvement on the old plan. The stair, broken into short flights, was more easily mounted; the hall itself, with fireplace,

formed a pleasant and useful room, fairly well lighted, partly from the stair-well and partly by borrowed light from the adjoining rooms. But it was in the artistic effect gained that the great attraction lay, the new arrangement being capable of an exceedingly beautiful treatment.

In New York and other large cities, where, on account of the high value of land, the attached house almost universally prevails, this type of plan, modified, of course, by circumstances, is still commonly adopted. (See Fig. 12.)

An excellent plan is that shown in Fig. 13 of a modern house by McKim, Mead & White, of New York. The entrance is on the

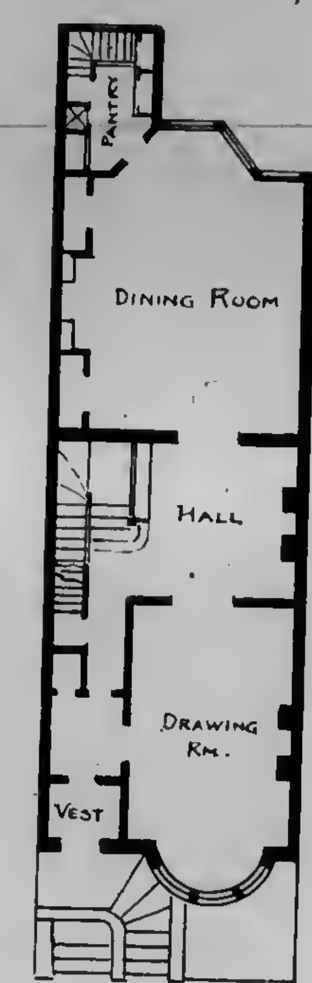


FIG. 12.

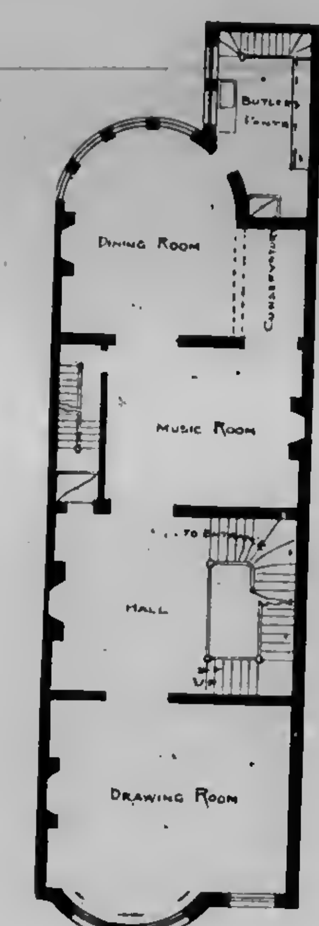


FIG. 13.

floor below that shown, being but a step above the ground, through a vestibule into a large hall occupying the whole front portion of the house. In this is the stair up to the principal floor (the one illustrated). There is a simplicity of treatment about both these plans that is most admirable and well worthy of study.

One difficulty common to the city house is in connection with the reception of guests. During an entertainment late comers are forced to run the gauntlet of the assembled guests to the central stairway before they can reach the dressing rooms, or the same inconvenience arises in the case of a person calling unexpectedly, it may be on a matter of business. An ingenious attempt to over-

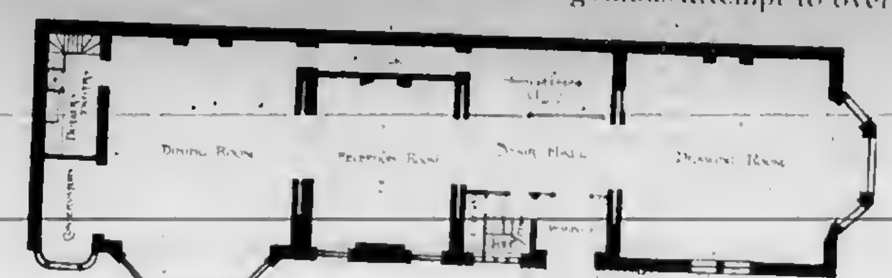


FIG. 14.

come this drawback is shown in Fig. 14, where we see a private stair is carried from the lobby off the vestibule for use under such circumstances.

In conclusion, there are many other points in connection with our subject both of interest and importance, but the paper is already too long, and the writer can only hope that the suggestions on house planning herein offered may not have been without some slight value to those who have heard them.

The Amherst Red Stone Quarry Co., of Amherst, Nova Scotia, start the season with excellent prospects. A large area has been cleared and the indications are that the stone improves steadily in quality as it extends westward. The company have put in a new boiler and have a steam drill at work. The latter is proving a great saver of labor; with it a hole can be made in five minutes that by the drill and hammer process would take three men two hours. The company, which at present employs 21 men, have been invited to tender on some of the best buildings now in contemplation in the lower province cities, and have already been awarded a number of important contracts.

TESTS OF QUICK-SETTING CEMENT.

ON this subject, Prof. Cecil B. Smith, of McGill University, writes to the Brickbuilder as follows:

Because of the abuse which our quick-setting cements (the natural set of which may be in ten or twenty minutes) receive at the hand of careless or ignorant users by frequent retempering in order to use large batches of mortar extending over a period of several hours, the following tests were made:—

The proportionate reduction of strength would probably hold true for mortars as well as neat tests.

In the tests a large batch of mortar was mixed up and briquettes were molded from it. At the end of one hour the remaining mass had become appreciably stiffened and was retempered by adding sufficient water and by vigorous working. The same process was gone through each hour, but very soon the activity of the cement was so greatly killed that the setting would not take place for many hours, and very little extra mixing was required.

The "Quebec Natural," corresponding to such United States cements as "Cumberland," "Round Top," etc., has an incipient set of about 30 min. and a full set of 2 to 3 degs. The "Peacock Portland" is a sound, well-burnt, but coarse English cement, having an incipient set of about 20 min. and a full set of 1 to 2 degs.

QUEBEC NATURAL.

	Time of Set	Neat Tensile Strength per square inch 1 wk.	1 mo.	10 mos.
Original test	3 hrs.	157 lbs.	278 lbs.	520 lbs.
1st retempering	4 "	123 "	210 "	485 "
2nd "	4 "	80 "	163 "	435 "
3rd "	19 "	73 "	153 "	405 "
4th "	19 "	52 "	157 "	380 "
5th "	19 "	72 "	172 "	295 "
6th "	21 "	....	173 "	290 "
7th "	....	....	....	265 "

PEACOCK PORTLAND.

	Time of Set.	Neat Tensile Strength per square inch. 1 wk.	1 mo.	2 mos.
Original test	2 hours.	407 lbs.	515 lbs.	596 lbs.
1st retempering	5 "	202 "	341 "	425 "
2nd "	4 "	184 "	290 "	382 "
3rd "	Very Slow.	185 "	365 "	388 "
4th "	"	....	165 "	308 "
5th "	"	213 "	347 "	383 "
6th "	"	180 "	310 "	402 "
7th "	"	220 "	332 "	367 "

This table seems to point out one or two things rather clearly:

1. That the first and second retempering do all the injury, the subsequent ones being merely the reworking of a mass which has not set.

2. That the strength of retempered cements is roughly one-half of those not thus treated.

3. That time does not "heal all wounds," as the strength at ten months with the natural cement, and two months with the Portland, has not recovered to any very appreciable extent. This last deduction does not agree with the student thesis paper on the subject published about two years ago in the Engineering News, which claimed a recovery of strength in course of, say, six months.

I trust that such a memorandum as this will bring out some discussion on the matter from men whose experiences on the subject will be of value to the profession.

A. C. Hutchison, architect, Montreal, recently had tests made of the new Kingsley water tube boilers in the Ottawa General Hospital. These tests are said to have given highly economical results, exceeding the makers' guarantees by 10%. This type of boiler was used in nearly all the recent Ottawa work, including the American Bank Note Co.'s works, and the C. Ross Co.'s building.

SAFETY OF ELEVATORS.

Mr. Fred. C. Floyd, Elevator Inspector, Boston, Mass., read a paper entitled "Modern Elevators" before the International Convention of Building Commissioners and Inspectors, in which he suggested the following additions to laws governing the installation and operation of elevators for passenger and freight service:

1. It is of first importance to introduce a provision that every elevator, whether for freight or passenger service, shall be operated by a competent attendant who shall not be otherwise employed.

2. It should also be made the duty of owners and tenants of buildings to notify the building commissioner or other authorities of any elevator accident upon or within their premises.

3. The inspection of new elevators in the absence of the manufacturer or his representative is often attended with difficulty in consequences of new appliances and their complicated character. A test of these devices by the manufacturer in presence of the inspector before the elevator has been accepted and placed in commission, should be made compulsory by law.

4. Some improved method of attaching hoisting ropes seems to be demanded, two accidents having recently occurred in Boston on freight elevators, caused by ropes pulling through the socket at the yoke or crosshead. One of these accidents was fatal to the operator, who fell with the car, the safety appliance of which was inactive and therefore useless in accomplishing the object for which it was designed. Here was an instance in which hoisting, rope and safety appliance were both defective at the fatal moment. A legal enactment would guard against such accidents by requiring a more secure method of attaching the ropes.

5. It should also be prescribed by law that elevator hoisting machinery shall be located where inspection and supervision shall not be difficult by reason of darkness and inaccessibility. This important and costly equipment is now too frequently placed in a contracted space in a dark basement and at the top of the shaft, or near the ceiling adjacent to the shaft, where a man cannot reach it except by introducing his body from a ladder through an opening too small to admit of comfortable passage, and into a space in which he cannot stand erect. I am aware that floor space is valuable, but if it is none too valuable for storage it is none too valuable for the location of expensive machinery that accomplishes such vast results and that sustains such responsibilities as the safe conveyance of human beings.

6. The number of infractions and defects discovered by the elevator inspection of the Boston building department is sufficient proof of its necessity, and the inoperative safety appliance is so frequently met that some remedy other than by inspection is called for, and I suggest a law that would provide for such an adjustment as will cause the automatic engagement of the safety apparatus each time the car descends to the bottom of the shaft, thus preventing rigidity by frequent operation.

7. Openings at street entrances to freight elevator shafts that extend to the sidewalk might be abolished with positive benefit to all concerned, and I recommend a legal requirement that such openings shall begin two or three feet above the sidewalk. The outside wall would thus afford protection against falling into the basement, and the maintenance of a gate, which now is so perplexing, would be unnecessary, while the delivery of freight would be attended with less manual labor, for the reason that a level platform would be feasible extending from wagon to elevator platform, thus permitting the use of a truck for transferring the freight.

STRENGTH OF BUILDING STONES.

The chief elements of strength in building stones are briefly described in a paper by Prof. Alexis A. Julien of Columbia College, as follows:

1. Interlockment of grains, of which three stages occur: irregular aggregation, in helter-skelter disorder and with poor consolidation; parallel sorting of grains; and dove-tailing, or interpenetration. The last is most thoroughly effected in the crystalline stones, and on it far more than on the specific gravities of the constituent minerals depends the weight, taken in mass.

2. Coherence between the grains, effected in two ways. First, cementation, mainly of the fragmental stones, by means of various natural cements, the presence of siliceous cement being the reason for the special excellence of certain sand-stones. Second, surface or capillary adhesion between the minute plates and grains, especially in the crystalline rocks. An important distinction must be made between the two classes of voids in a stone, the pores and the cavities, this involving the subject of the different destructive effects of cavities and pores when filled by flakes or films of ice. This question also includes the solubility of stones and their cements in fresh and salt water, upon which there is need of further investigation.

3. Tension among the mineral grains, and the active stresses which survive in stones and affect their strength, of which three classes occur. First tension produced by crystallization; second, tensions produced by subterranean strain; third, tensions produced by present physical conditions; all of which may cause a stone to behave very differently from previous specimens examined and tested.

4. Rigidity, or absence of mobility among the grains of a stone. Evidences of internal motion, flexibility, and plasticity in stones may be attributed to three sources. First, cleavage planes of cleavable minerals, particularly mica; second, gliding planes, illustrated by the miniature faults abounding through all varieties of stone; third, the presence of a lubricant, such as oil, bitumen, and especially of water. The influence of water in nearly all stones is most important, and there is need of special methods for determining the strength of wet or moist stones, especially as regards diminution of rigidity from this cause.

PERSONAL.

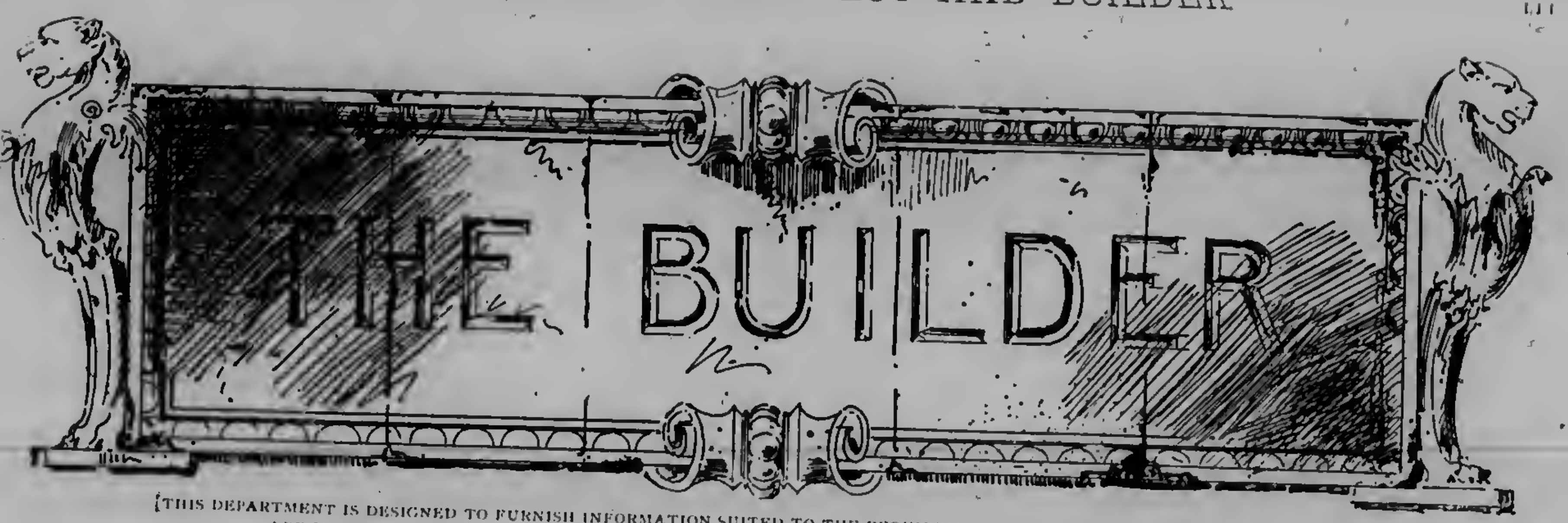
Mr. J. M. Mallory, architect, has recently opened an office in Vancouver, B. C.

Mr. Joseph Wright, of Toronto, president of the National Plumbers' Association of Canada, has just returned with his family from a trip to British Columbia.

Mr. Wm. Bunney, architect, has severed his connection with the Wm. Cane & Sons Manufacturing Co., and removed from Newmarket to Ottawa, having accepted a position with Messrs. W. C. Edwards & Co., of that city.

The executive of the National Plumbers' Association have in preparation a directory of all master plumbers in Canada.

The corporation of London, Ont., is threatened with suits for recovery of fees by some of the architects who submitted designs in the recent Victoria Hospital Competition.



[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Flat Roofs. A so-called flat roof, if properly covered and suitable materials used for the purpose, is as effective and will last as long as any other roof, cost and position being taken into consideration. In Canada and, indeed, many parts of the United States, the question in making a roof that confronts the contractor and owner is the important one of cost—first cost. The owner wants a good roof for as little money as possible. To meet this condition, the architect specifies a roof only good enough to save his reputation; the contractor follows the architect with a series of parings down, so that the roof seldom gets all the architect specifies, and the end is, a roof that in a few years gives satisfaction to no one. Owners should not permit themselves to be persuaded into accepting a pitched or tarred roof. While many of them may hold good for five or six years, few of them can be relied upon for more than three years in this variable climate, and any guarantee given by the contractor to keep the roof in good order for a period of five years is often worth about as much as the paper it is written on, as an experience of many years has proved. When a roof becomes troublesome, it is discovered the contractor is out of town, out of business, or in such a position as to render it impossible for him to attend to the matter; or it may be when the roof is loaded with snow, and the weather such as to prevent repairs being done; but the leak, like Tennyson's rivulet, "runs on forever," and more damage is done to the hidden timbers and exposed plaster than would have covered the extra cost of a first-class roof in the first place, and this damage is an expense, even if the guaranteeing contractor repairs the roof, for it must be remembered the contractor only guarantees to keep the roof in repair for five years. He does not guarantee damages. After being repaired two or three times, the whole roof covering gets in a bad condition, partly from unequal shrinkage of old and new materials, and partly because of the tramping and cutting and pounding of the workmen. Taking it all in all, a tarred and gravelled roof is about the most expensive in the end, and is never a satisfactory one.

If a composition roof is not a cheap or a good roof, what next best material will answer, and yet not be too costly? To answer this question properly would require a knowledge of all the conditions connected with the particular roof enquired about, and as these conditions change with localities, it would hardly be safe to offer as an inflexible rule, the use of any particular material. It is safe, however, to say that both a good brand of roofing tin, or a good quality of suitable gauge galvanized iron—say 28 gauge—would be better, and in the end cheaper, than any roofing composition the writer knows of. Tin has its advocates, who claim that when properly laid, and good I.C. charcoal tin employed, the roof will remain good for 25 years, and if painted once in seven years with a good roofing paint, it will remain good for 50 years. This is rather a long while for a tin roof to last, but we know of several instances where they have lasted even a longer period than that. The cost of a tin roof properly made and laid, compared with a first-class composition roof, will be about as 10 to 7 per square; that is, a composition gravel roof costing $7 per square, a similar roof, having the same conditions, would cost, if of tin, as described, about $10 per square in the same locality. These prices, of course, are only comparative. Both gravel and tin roofs may be made for less money, or they may cost more. A composition roof will not remain good for more than 10 years at the farthest, while a tin roof that will not remain good for 20 years will be considered a very poor roof indeed. Considering these figures, it will be seen at once that a tin roof is from 25 to 40 per cent. cheaper in the end than one covered with composition. For many reasons a galvanized iron roof is preferable to one of tin if care is observed in putting on and a good brand of iron used. For flashings around chimneys and alongside fire or division roofs, the iron should be built in the wall as the work progresses, and the mortar used should be composed of one and one of cement and sand. The flashings should be "stepped" at regular distances, and when the iron is laid on the roof the flashings should be brought down and folded to the proper angle, well nailed and properly soldered. It is better to use tinned nails for this work, then if by any means moisture should attack the nail there will be no corrosion, as the tin will protect the nail. The edges of the iron should be turned up over battens and so arranged that two edges meet on the batten, one edge lapping over the other in such a manner that a row of tinned nails may be driven along the centre line of batten, fastening down both edges at once. All the nailheads should be covered with solder, thus insuring a water-tight joint. Battens may be one and one-half inches square. The angles at the battens make ample provision for contraction and expansion.

School Blackboards. Nearly every workman, carpenter, painter or plasterer will tell you he has a good method for making a blackboard suitable for school purposes, and yet, it is a fact, that good durable and satisfactory blackboards are like "angels' visits." In cities and the larger towns, good boards may be found, but in country places, the home

of the little red school-house, a good blackboard is a rara avis. The reason for this is mainly because the trustees, not being aware of the fact that a good board cannot be made for a few cents per square yard more than ordinary plastering, refuse to allow a fair price for a good article, and the consequence is that the contractor must make a board to fit the price, and, in eight cases out of ten, the country contractor never had the opportunity of seeing a good board made, and therefore knows nothing of the methods employed or the materials used for the purpose. The best blackboard is, of course, made of slate—black, or dark blue—and may be ordered from any dealer in roofing slates, in sizes varying from 2′ 6″ to 3′ 6″ in width, and from four to seven feet in length. The cost of these slates, however, is more than country school trustees would care to expend when they know they can obtain something that will answer for a very much smaller sum. When a blackboard is to be made of wood or boards, the following suggestions should be adopted: Procure wide boards of clear pine or basswood, $\frac{7}{8}$ inch thick; groove both edges that are to be joined together, making the grooves half inch deep, and quarter inch wide. Then make a tongue one-quarter of an inch thick, and fifteen-sixteenths inch wide. Joint and glue the edges of the boards, cramp with screw-cramps to make a good joint, insert the feather or tongue before cramping, first giving it a coat of glue. When dry and hard, add another width of board, going through the same process, until the board is made the width required. When dry, screw batons to the back of the board, batons to be about 4 inches wide and $\frac{7}{8}$ inch thick, and to be placed about two feet apart. Dress off smoothly on face and finish up with fine sand-paper, then paint with drop black mixed with dryer and spirits of turpentine. Do not use oil of any kind. Make a crayon and eraser tray and attach. When all is dry, rub down again with No. 0 sand-paper, brush off, after which give the board two coats of liquid slating, which may be obtained through your druggist, or cover it with the materials recommended by the Educational Department of Ontario. This makes a fairly efficient and durable board, and is cheap. It may be re-coated with the liquid at any time.

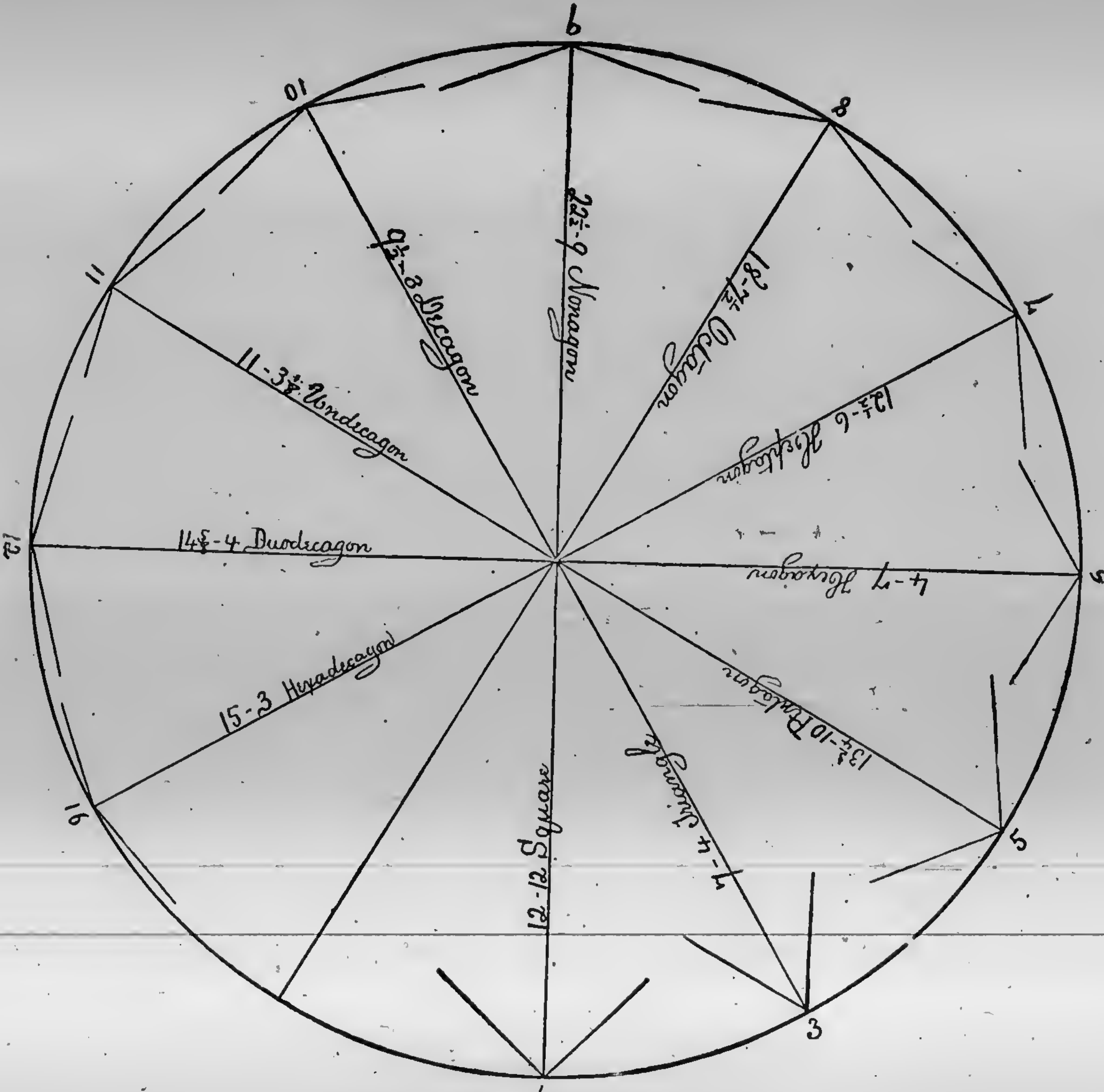
Plaster Boards.

FREQUENTLY the plasterer is called upon to make a blackboard of mortar when he is plastering the walls, and if the work is done properly a board of this kind is generally pretty satisfactory. A good blackboard, however, can never be made of mortar unless the wall is prepared specially for it. The main requirement is solidity, and if the wall is brick, stone or concrete, then good results should follow, but if hollow, formed of studding sixteen inches from centres, with lath nailed on them, the usual way, it will be simply impossible for any plasterer to make a good blackboard on it, no matter how good the materials may be he employs. If the studding is boarded over with boards, and the lathing nailed on this double thickness, diagonally, and the wall does not settle, a fairly good blackboard may be made on the wall. When it can be afforded, it is better to fill in between the studding with brickwork that portion of the wall intended to be covered with the blackboard, allowing the bricks to project inwardly sufficiently far to receive the plaster on the same surface as the rest of the wall. This would allow the brickwork to be "rendered," when the other part of the wall was being first-coated. Another way which is sometimes done is to line up the studding on both sides with rough inch boards over the surface intended for the board, and the spaces filled in with fine concrete or with grout, provision being made with the inside lining to admit the grout or concrete projecting inside the wall far enough to admit of being "rendered" same as brickwork as mentioned above. In using grout or concrete, time must be allowed for the material to become dry, or nearly so, before the plastering is done, or the work will likely check or crack. A fairly solid background may be obtained by using double the number of studs in the wall where the board is to be; that is to say, place the studs eight inches from centres, instead of sixteen. The spring between them at this distance will stand quite a while. The following is a very good method for the plasterer to follow in making a blackboard on a new lathed wall: Plaster the wall with a good scratch-coat of hair mortar, gauged with plaster of Paris. When dry, finish with an ordinary coat of "brown" mortar, colored black with any of the mortar mineral blacks, obtainable in any well supplied hardware store. When hard and dry, finish with a good coat of "hard finish," colored black with drop black dissolved in alcohol. When this coat is dry, apply two coats of liquid slating made as follows: One pound of white shellac, one-half pound powdered pumice-stone, one-quarter pound lamp-black, dissolved in one gallon of pure alcohol. If the blackboard is to be put on a brick, stone or concrete wall, the scratch-coat may be omitted. If these directions are closely followed, the work will last for years, and will be sure to give satisfaction. Flour emery may be substituted for powdered pumice stone; it will wear longer, but is not so effective on the board, and, being heavier, care must be taken in applying the liquid. It must be well shaken, as the emery will settle to bottom of vessel otherwise. A good coating for wooden blackboards may be produced from the following: Incorporate flour-emery with shellac varnish, adding sufficient lamp-black to give it the required color. If too thick, reduce its consistency with alcohol. Apply to the board with a camel's hair brush. Another good coating may be made by mixing pulverized slate or quartz rock with silicate of soda (water-glass of commerce), adding lamp-black to suit, and apply to the boards by means of a brush. This last mixture serves a good purpose in recoating old blackboards on plastered walls. The old work in all cases must be rubbed smooth with fine sand-paper before the mixture is applied.

Brickwork.

NEARLY every contractor has a way of his own of estimating brickwork, and it is a curious fact that authorities do not agree as to the actual number of bricks required to complete any given piece of brickwork. This variation is in some measure due to the fact that bricks vary in size, and that some bricklayers make thinner joints than others. In Ontario the contractor should base his estimate on the following figures, which experience has proven to be, on an average, correct. For a four-inch wall such as is employed for veneered brick houses count eight bricks for every superficial foot of wall. For a nine-inch wall multiply each superficial foot of wall by 15. In a fourteen-inch wall multiply each superficial foot by $22\frac{1}{2}$, and for an eighteen-inch wall multiply

by 30. Measure all sides of the building from corner to corner; this takes in the corners twice, which compensates somewhat for cuttings, "bats" and chipped closers. As a rule, a bricklayer, with a laborer to keep him supplied with materials, will, in common house walls, lay on an average about 1,500 bricks in 10 hours. In better class work, such as facing a front of a building, from 1,000 to 1,200 bricks, properly laid, may be taken as a good day's work; for street fronts, where there are arches to cut and gauge, from 700 to 900; and on very fine work, where there are a number of angles, offsets, arches and skew-backs to be fitted to, a man will not be able to lay more than from 150 to 300 bricks per day. In plain, massive engineering work a man would average about 2,000 bricks per day. In making estimates for brickwork the size and quality of the building should be considered. The price per thousand for laying should be greater on a small building than on a large one, and it will not cost so much to lay bricks on a low building as on one higher. On a high building, one laborer may not be able to carry up enough bricks and mortar to keep him steadily employed, and if another laborer becomes necessary this will make a difference in the cost of laying per thousand. When making an estimate, it is as well to figure separately on the different grades of work, assuming a price for each. Arches, cornices, quoins and ornamental belting courses should be estimated by the foot, the price, of course, varying with the amount of cutting and the depth of the work. At this writing, brickwork for ordinary buildings costs to lay, including scaffolding, mortar and usual archings, about $7 per 1,000. In some localities the cost may be more—in many it is less. This price is for good work, and is exclusive of cost of bricks. First-class front, pressed brick work is worth all the way from $10 to $20 per 1,000 to lay them, including colored mortar. These prices are only given as being approximate, and may have value when actual prices for given work are not available. In large contracts a percentage should be added to the result of the estimate to insure the contractor for risks, breakages and unforeseen delays.



STEEL SQUARE SOLUTIONS.—BEVELS FOR POLYGONS.

Mitres and Angle Cuts.

THE diagrams shown herewith will enable any mechanic to obtain, by the aid of a steel square, the bevels or angles suited for the correct making of the polygons named in the diagram. The method for obtaining the angles as set forth and figured is the result of using two sets of figures on the square—one on the tongue and one on the blade. With the exception of the triangle, all the bevels used are those formed by the tongue of the square, the three-sided figure being formed by the bevel line on the blade. It is not necessary to give a long explanation of the why and wherefore of these cuts or bevels, suffice it for the workman to be able to get them and to know they are correct. A few examples, how-

ever, will give the operator an idea of how the figures are applied. Let us suppose we want a "mitre-cut" for a nonagon or nine-sided figure: Find the figure 9 on the outside of the circle, and following the line inside, we find the figures 22½ and 9. These figures indicate that we are to take 9 inches on the tongue and 22½ inches on the blade; lay on a line—same as for braces or rafters—mark down the tongue; this line will be the bevel or mitre for the angle of a nonagon. Try it by cutting nine pieces of stuff all the same length at the long points, using this bevel at each end. In like manner all the other bevels are obtained. We recapitulate the figures and polygons:

For a triangle	4 in. on tongue,	7 in. on blade,	blade gives cut.
" square mitre	12 " "	12 " "	tongue "
" pentagon, 5 sides	10¾ " "	13¾ " "	" "
" hexagon, 6 "	4 " "	7 " "	" "
" heptagon, 7 "	6 " "	12½ " "	" "
" octagon, 8 "	7½ " "	18 " "	" "
" nonagon, 9 "	9 " "	½ " "	" "
" decagon, 10 "	3 " "	9½ " "	" "
" Undecagon, 11 sides	3⅛ " "	11 " "	" "
" du decagon, 12 sides	4 " "	14⅝ " "	" "
" hexadecagon, 16 sides	3 " "	15 " "	" "

This table and diagram will be found very useful, and will save much time to the workman if he will memorize the whole matter. If this is not possible, it will be well for him to copy it and paste the copy to the inside of the lid of his tool chest. The lines making the "crow's

Royal Victoria Hospital, Montreal.

feet" at the end of the radii show the direction of the sides necessary to be made to form the figure required, as indicated by the number on the outside of the circle.

DOMINION PLUMBERS' CONVENTION.

Arrangements for the third annual convention of the National Association of Master Plumbers, Gas, Steam and Hot Water Fitters of Canada, to be held in Quebec from the 29th inst. to the 1st of July inclusive, are nearing completion. The headquarters of the Association during the convention will be at the Victoria Hotel, where the business sessions will be held. The programme which is being arranged for the occasion is designed to afford both profit and pleasure to the delegates. It might be well just here to mention that the convention is not intended to be one for delegates only, but is open to every one who is a master plumber, gas, steam or hot water fitter, and no one will be held by any action to be taken unless he is or becomes a member.

For the benefit of those who are not familiar with the present workings of the association we will state that about two years ago the men who directed its affairs, with the object of protecting the interests of the contracting plumber and fitter, adopted in July, 1896, certain "Trade Resolutions," which have received the assent of the Manufacturers' Supply Association, and by which the manufacturers agree not to sell goods to other than legitimate plumbers and fitters.

It is the hope of the executive committee, comprising Joseph Wright, President, Toronto; Wm. Smith, Vice-President, London; W. M. Briggs, Treasurer, Montreal; Wm. Mansell, Financial and Recording Secretary, J. B. Fitzsimmons, Toronto; C. E. Pickard, Quebec; Thos. Campbell, New Brunswick; G. A. Perrier, Nova Scotia; T. Stevenson, Manitoba; Joseph Lamarche, Montreal, that those plumbers and fitters who have hitherto held aloof from the Association, will become a part of it, and take part in the proceedings at the forthcoming convention.

In addition to the business programme, the local association is making arrangements to give delegates a most hospitable reception to the Ancient City. With this object a number of excursions to interesting points in and around the city have been planned, and special care will be taken for the pleasure and comfort of the ladies who may accompany the delegates to the meeting. The local committee who have these matters in hand is composed of Messrs. R. Sampson, C. E. Pickard, A. Forest and W. H. Wiggs.

Mr. Joseph Wright, the president of the association, while on a visit to the Pacific Coast last month, brought about the organization of Master Plumbers' Association at Vancouver, and it is understood that a representative of this new association will attend the Quebec convention.

Arrangements have been made with the railways for return tickets to delegates at one and one-third fare, on the certificate plan. Those not acquainted with the certificate plan should at once write the secretary of the association, Mr. Wm. Mansell, Adelaide street west, Toronto, for particulars.

QUESTIONS AND ANSWERS.

A correspondent, writing from Burk's Falls, asks the following: "I will be glad if you can give us any information as to the best methods of waxing floors, preparing the wax, and where it may be procured, etc.? Perhaps some of your readers may have some suggestions they would be willing to give through the columns of your paper."

The following is offered in reply: 1st. The floor should be of good sound hardwood, and should be perfectly clean and smooth. 2nd. Fill with any of the regular wood fillers; Wheeler's is one of the best. If a color is wanted, mix the color with the filler; rub in the filler until the pores of the wood will take no more. 3rd. Let stand about twenty-four hours, then sandpaper smooth and clean off well. 4th. To prepare the wax, take, say one or two pounds of ordinary bees' wax, mix with spirits of turpentine made hot over a sand bath, that is, put sand in common iron pot and put over a fire until the sand is made as hot as boiling water, then in a tin can or other suitable vessel pour in the turpentine and let it remain until the spirits is hot enough to melt the wax. Cut the latter in small pieces and drop gently into the hot turpentine; stir up until the whole forms a sort of thin creamy mixture. Apply this to the prepared floor, hot, with a clean paint-brush; let stand for an hour or two, then polish with a hand brush, either by hand, or with a long handle, and the brush weighted down. Brush until a fair polish is obtained. In a few days polish again, without applying wax, with the same brush. About a week or ten days after, polish again, rubbing a little plain bees' wax on the brush, and the floor will look very well if the work has been properly done. Whenever the floor gets dull, or shaded, or scratched, simply polish again, using only common bees' wax on the brush, and the work will look as good as new. In many of the old Halls in England, the oaken floors have been waxed at regular intervals for centuries, and they look as well, yea, better, than when first laid. The fashion of having hardwood and parquette floors is becoming quite common in the United States, as well as in England, and in some of the most costly homes, nearly all the floors are of hardwood, and few carpets are used, there being only here and there a costly rug or mat. Floor wax is manufactured and sold by a number of firms in Boston, New York, Philadelphia and Chicago, and brushes made especially for polishing can be had from any of the firms selling the wax polish. "Old English floor wax" is advertised by a firm in Cincinnati, and along with it is also advertised the brush. We shall be glad to receive from our readers anything supplementary to the foregoing.

THE CHAMPLAIN MONUMENT AT QUEBEC.

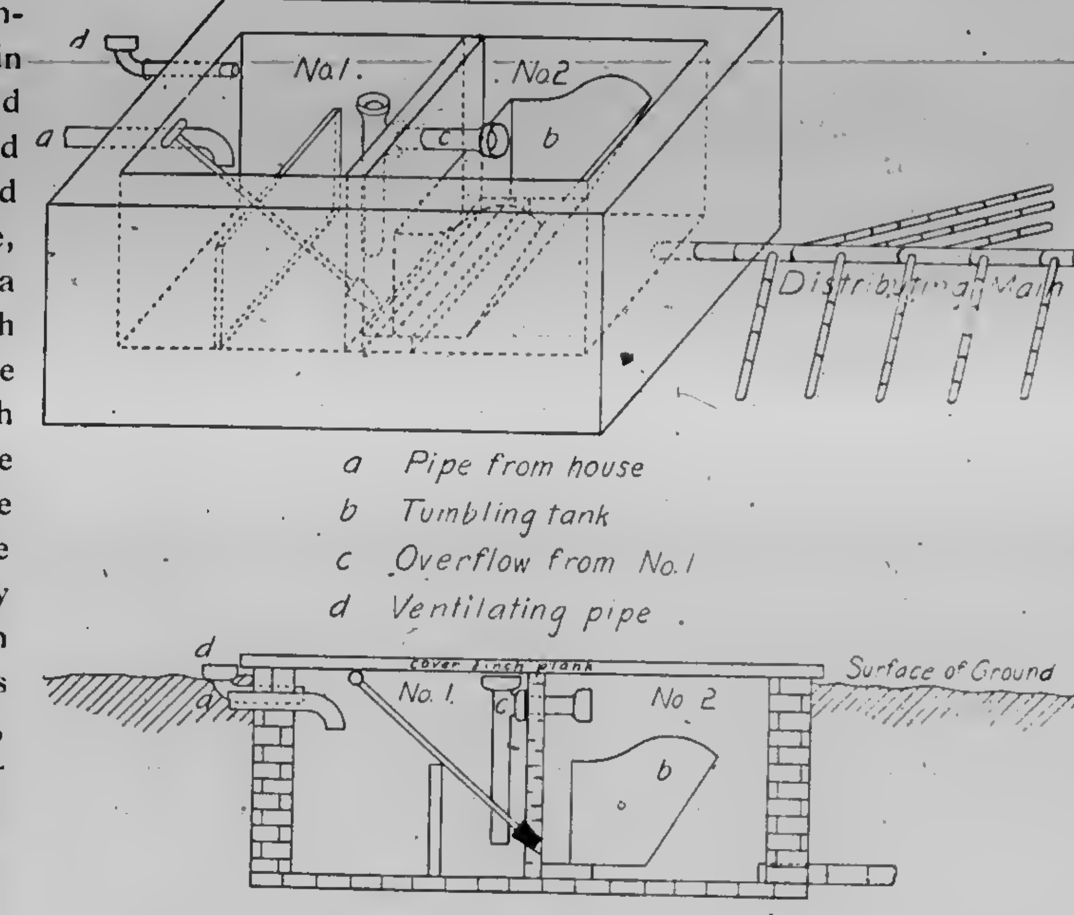
The bronze statue of Champlain, to be erected between the post office and the Chateau Frontenac, at Quebec, is at present on exhibition at the Paris Salon. It will shortly be forwarded to Quebec and placed in position on the granite base, which is about to be constructed, and which will occupy a space 40 feet square. The statue itself is fifteen feet high and the base 37 feet, or a total of 52. Mr. Le Cardonnel, the architect whose design for the monument was chosen in competition, is a student of the School of Fine Arts of Paris, and is the winner of several other important competitions. The sculptor is Mr. Paul Chevre. The inauguration of the monument, which is to cost $30,000, will take place in September.

The Great Northwestern Telegraph Company are installing a new heating system in their large building in Montreal, using the Kingsley water tube boiler installed by E. A. Wallberg.

The Cutler Manufacturing Co., of Rochester, N. Y., the well-known makers of mail chutes, are mailing to architects, in portfolio form, a series of five interesting pen and ink drawings by Harvey Ellis.

DISPOSAL OF SEWAGE OF PRIVATE AND PUBLIC BUILDINGS.

In an article contributed to the Transactions of the Engineering Society of the School of Practical Science, Toronto, on the "Disposal of Sewage," Dr. P. H. Bryce, M.A., M.D., secretary of the Provincial Board of Health of Ontario, recommends the method shown in the accompanying diagram for the purposes of a private house, large hotel or public building, as for



Disposal of Sewage of Private and Public Buildings.

instance a county poor house or asylum. Such a method, he states, will amply supply all the needs by a system of sub-surface field tiles, which, if placed under a garden, not only will dispose of the sewage without cost or nuisance, but will add materially to its productiveness.

IMPROVED METHODS OF TESTING CEMENT.

The German Portland Cement Manufacturers' Association, in conjunction with the testing department for building materials of the Royal Testing Laboratory of Berlin, have instituted elaborate investigations with the view of improving the methods of testing cement, so as to secure greater uniformity than at present in results of such tests. The same subject is now engaging the attention of a special committee of the American Society of Civil Engineers. The following general conclusions have been reached as the outcome of the German experiments:

In mixing the standard mortar of one part by weight of cement and three parts of standard sand, as much as 8.8 pounds may be used, yet it must be considered that the strength of briquettes of this mortar decreases when the mixing is continued longer than three minutes. As it has been observed that more intimate mixture of the mortar than is attainable with the trowel promotes the uniformity of the separate results, another method of mixing, such as by machines, is to be preferred.

The amount of water for the standard mortar must be proportioned to the properties of each cement and ascertained in each particular case.

With respect to the fastening and holding of the molds, it is to be noticed that the tensile strength of the

standard mortar can suffer if the mold is not held fast to the table.

The oiling of the molds, particularly in preparing briquettes of neat cement, should not be omitted, but is to be done carefully in order that the strength of the pieces may not go down. Thin oils are better than thick. A mixture of three parts of rapeseed oil and one part of petroleum has given satisfaction during several years.

In order to obtain uniform results it is necessary in tension as well as compression tests to adhere to a definite amount of mortar. The amount for each mold is to be weighed out. Mortar placed lightly in the mold gives uniform results, while the strength is increased in an uncontrollable manner by pressing the mortar into the molds. In Mr. Gary's experiments 1.9 pounds of mortar are used for the compression test pieces, and 0.4 pound for briquettes, except in the case of light cements, when 0.44 to 0.5 pound is used.

When the mixing has been done with a trowel by hand, the greatest density and strength is given to both tension and compression test pieces by 150 blows of a 4.4-pound hammer. A reduction in the rate at which the blows are delivered influences the strength of the test pieces, and on that account the blows should be delivered at a rate of fifty per minute.

The test pieces must be carefully struck off and smoothed on the top if the most regular and reliable results are to be obtained. Mere striking off without smoothing lowers the strength and uniformity of the tests.

Tension test pieces cannot be left more than half an hour in the molds without influencing the results, while pieces for compression must be left 24 hours in the molds. The pieces must be kept under entirely similar circumstances.

Slow-setting cements must be protected from strong and protracted shaking during setting, because such shaking has a retarding influence which seems to increase with the age of the test piece. Experiments to determine the behavior of quick-setting cements under such conditions have not yet been undertaken at the laboratory. Fresh test pieces must be protected carefully from drafts and dryness.

For comparative tests of cement the water in which the pieces are placed should be kept as nearly as possible at a constant temperature of from 59 to 64 degrees Fahrenheit. The strength of the piece is increased by raising the temperature of the water, but the influence of temperature varies among the different brands, being apparently greater in the case of stronger cements.

ELECTRIC HEATING AND ITS APPLICATIONS.*

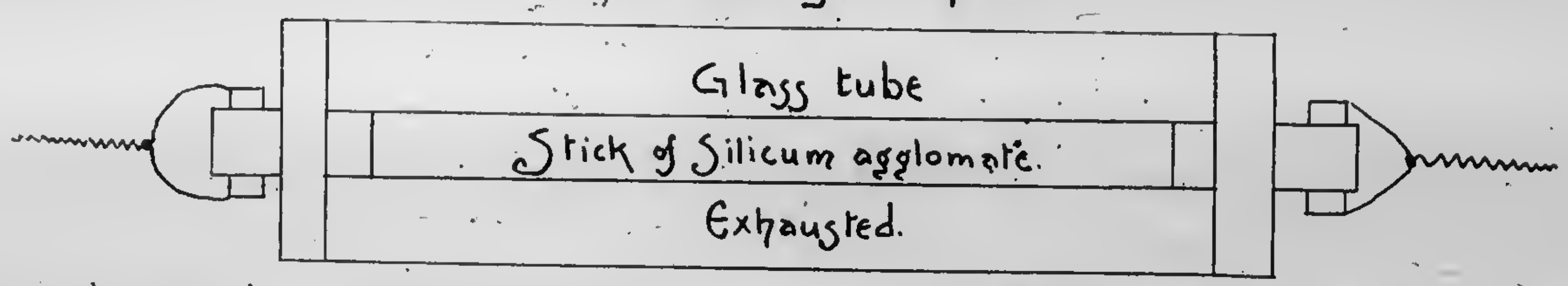
By M. Fernand Le Roy, C.E.

In pursuing his researches Mon. Le Roy sought to attain the following results:

The construction of apparatus of such simple and handy form that the ordinary domestic would experience no difficulty in using it; to make the application readily available in conjunction with the present forms of saucepans, kettles, stoves, irons, etc., so that any change of method on the part of housekeepers would be avoided.

The system is described as consisting essentially in what is called la Buche electrique, or the electric log. A stick of silicum agglomerate metallised at each extremity in order to prevent the overheating of the joints and to insure good contact at the sockets is inserted in a glass tube, from which, to prevent the oxidation of the silicum, the air is exhausted. The two extremities of the glass tube are set in plaster and the metal ends of the stick are attached to the contact pieces in the same manner as in the case of incandescent lamps (see diagram).

Bûche Electrique
Actual Size.— Plan.

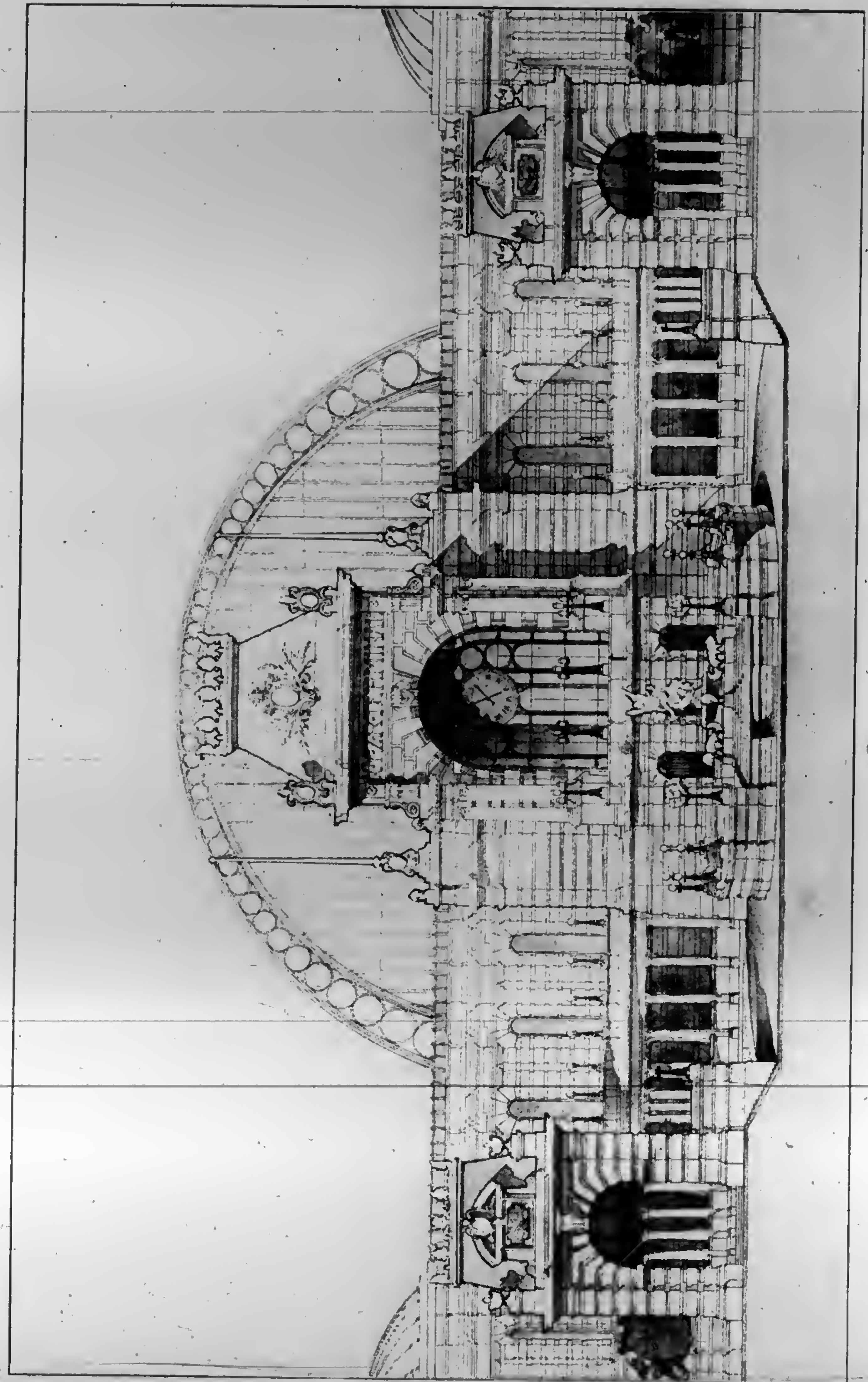


Metal spring clips render the insertion of the heater in the circuit an extremely simple operation.

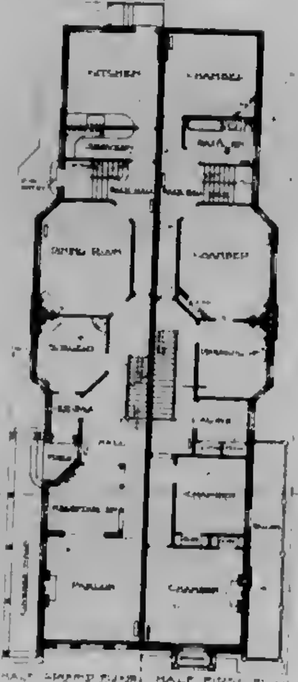
Each buche or heater is constructed of such dimensions and resistance that the power absorbed under a pressure of 50 volts is from 60 to 100 watts, but of course they can be used under any voltage by arranging them in multiple series.

For warming rooms the apparatus would be particularly serviceable, and for general purposes in the kitchen this simple appliance is equally adaptable, as it can be utilized in connection with our present utensils. Hitherto electric cooking devices have been constructed on a much more elaborate and consequently expensive principle, but the method here described bids fair to revolutionize this branch of electrical industry.

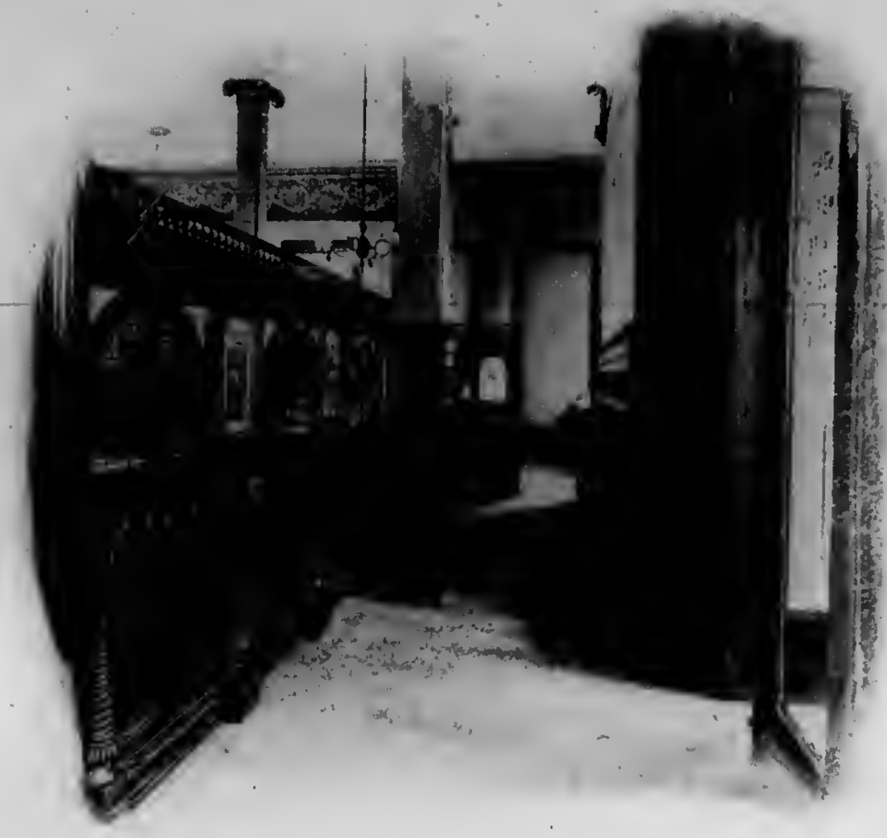
* Summary of paper communicated to the Society of Civil Engineers, Paris; Feb. 4, 1898.



A Design Prepared for the Tenth Annual Competition of the Architectural League of New York.
Subject: Entrance to a Terminal Railway Station.
Arthur E. Wells, Architect.



Residences for Miss Morrison, at 34 and 36 Carlton Street, Toronto.
Langley & Langley, Architects.



Cashier and Loan Department.

Facade on Street.

Staircase Leading from Hallway.

Vestibule Entrance.

Board Room.

NORTH AMERICAN LIFE ASSURANCE CO.'S OFFICES, KING STREET, TORONTO.

Erected for the United Empire [illegible]s.—Grant & Dick, Architects.

Remodelled for the North American Life Assurance Company, 1897—Langley & Langley, Architects.

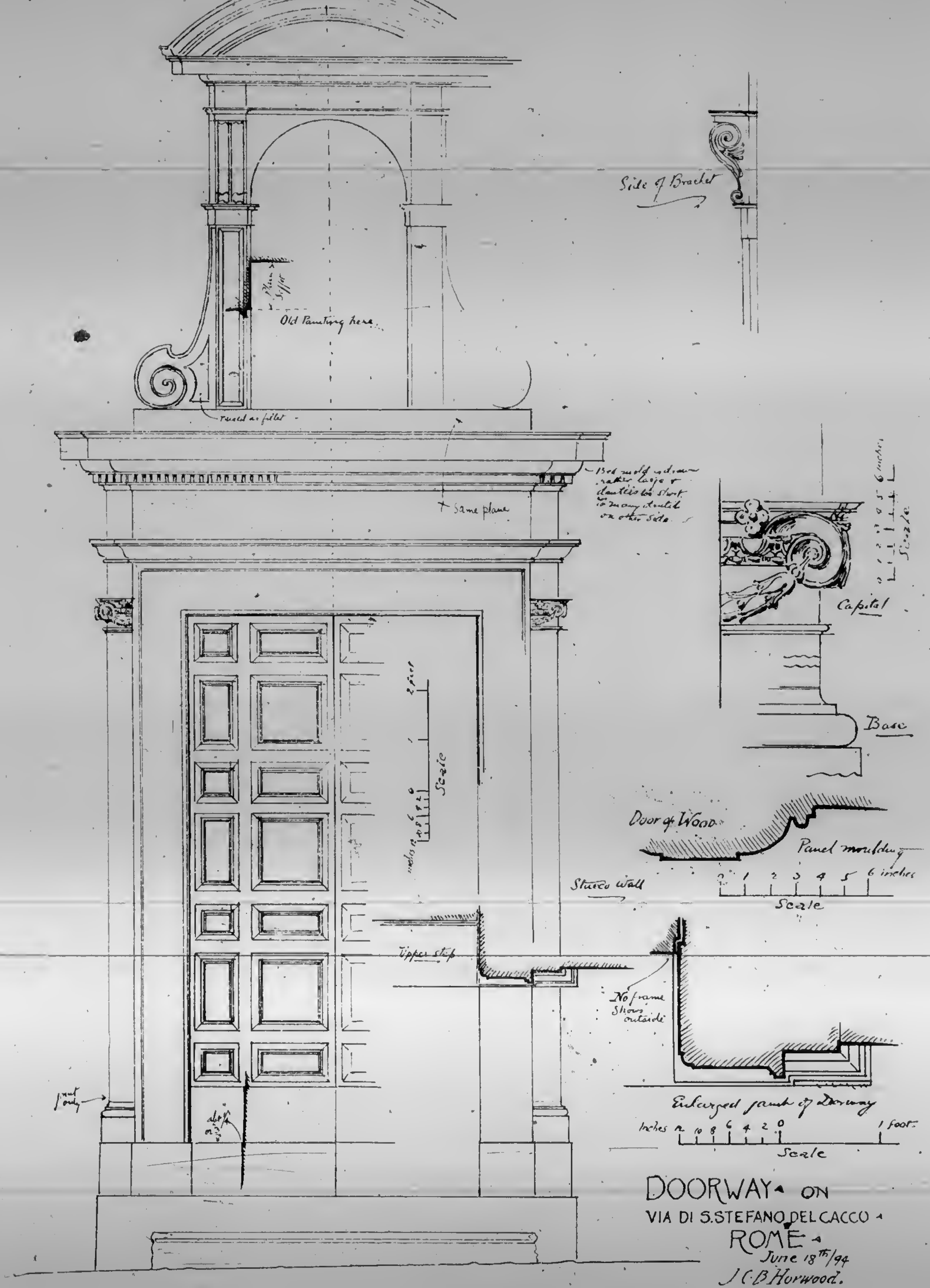
Residence at London, Ont.
Moore & Henry, Architects.

DESIGN FOR SCHOOL
PERSPECTIVE VIEW.

DESIGN FOR SCHOOL.
W. A. EDWARDS, ARCHITECT, HAMILTON, ONT.

SKETCH FOR CHURCH DOOR

J. A. RADFORD
ARCHITECT
TORONTO



DOORWAY ON VIA DI S. STEFANO DEL CACCO, ROME.

MEASURED AND DRAWN BY MR. J. C. B. HORWOOD

DESIGN FOR COTTAGE.
ARTHUR E. WELLS, ARCHITECT.

CANADIAN ARCHITECT AND BUILDER.

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—THE—

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ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery.

Fostering Native Art.

THERE is one condition attached to the expenditure of $50,000 annually on art in New York. The work upon which the money is expended must be the work of artists resident in the United States. This is money well invested. If art is to exist at all in a country it must have opportunity. There is only one way to attain to skill in art and that is by working at it. The sooner a nation resolves to do its own art the better for its art. It would be a solid advantage if there could be some reasonable sum to be annually disposed of in Toronto under the direction of the Toronto Guild of Civic Art, that some opportunity may be afforded also to artists and sculptors in this country.

A New Style of Competition.

THE practice of wolfing for work is not considered necessary in the higher walks of architecture in New York. It appears that when the commission for the new National Art Club was offered to Messrs. Carrere & Hastings they thought that as the proposed club was intended to be a haunt for architects as well as artists, a more clubable way to proceed would be to take equal chances for the work with other well known architects of New York. Accordingly, after a luncheon in honor of the proceeding, Messrs. Carrere & Hastings, McKim, Mead & White, George B. Post and Babb, Cook & Willard drew lots a process much less exhausting than, and quite as satisfactory as a competition. The result was a parable for the lot fell, after all to Messrs. Carrere & Hastings.

Professional Ethics.

IF good professional ethics in relation to one another were the rule among architects, while the conditions of practice would be more conducive to doing good work the total result in the distribution of employment would be much the same as if the "get there" idea were to prevail. Professional habits, as followed by those of the profession who have, as the French say "arrived," are rather an index of how they achieved their position than, as is sometimes supposed by the irregulars, a creation to help them to keep it. The only way to permanent success is expertness, and this is to be attained not by working for work but by working at it. The

young architect whose ideal or practice is to become a man in the street, dusting about to procure work for draughtsmen to do, has entered upon a career which can have only one end, the gradual elimination of real architecture from his work, and his own gradual elimination from a profession in which the first requisite is, after all, architecture.

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Art Commissions. Art commissions for large cities is becoming an established institution. There are several in the United States and one in Canada, in Toronto. The powers of the commission vary, but all possess the essential characteristics of voluntariness and independence of the city vote. The new act creating the art commission of the city of Boston, which we have before us, provides a commission consisting, besides the Mayor, entirely of head officers of different institutions of the city; the president of the trustees of the Public Library, the president of the trustees of the Museum of Fine Arts, the president of the Boston Society of Architects and the president of the Massachusetts Institute of Technology. The titles of these officers suggest a safe rather than an adventurous commission. In New York the commission is disposed to take the initiative, and has proposed the erection of a $100,000 fountain in Central Park. The price is mentioned as $100,000 to $150,000, so that perhaps the larger sum may be taken as the proposed price. As the city of New York is allowed to spend $50,000 annually on works of art it would not take long to pay for this work.

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Sizes of Bricks. In England the size of bricks is fixed by law, and it would be well if some member of parliament would take the subject in hand and bring up an act in the Dominion to fix the size of bricks to be used in this country. For want of such a law here, the building interests are often handicapped. A thousand bricks, when each brick measures $9 \times 4\frac{1}{2} \times 2\frac{3}{4}$ inches, make a different sized wall from one made of a thousand bricks where each brick measures only $8\frac{1}{4} \times 4 \times 2$ inches, and yet there is this difference and even more—in the size of Canadian bricks. If all bricks were made to one uniform size throughout the whole Dominion, contractors in Vancouver would be able to estimate on brickwork in Halifax with a certainty that their quantities were right, and one of the reasons for wide discrepancies in bids for work would be removed. A good size for a brick is $8\frac{1}{4} \times 4 \times 2$ inches. This size is easily wrought, is a good size to burn, handy to lay, easy to bond, and has a good appearance when in the wall. A brick this size contains 66 cubic inches, and if hand-moulded and well burned, weighs about $4\frac{1}{2}$ pounds, or 118 pounds per cubic foot, 14,223 pounds to the cubic yard, or 498 bricks per ton. Pressed bricks this size will weigh about five pounds each. If made wet, either brick will absorb from half to three-quarters of a pound of water. There have been very few failures of brickwork on account of crushing, and, while some bricks have withstood a compressive force of 13,000 pounds to the square inch, it is wise never to subject them to a greater pressure than 250 pounds to the square inch. In heavy structures much care should be exercised in the choice of bricks, and those made in a yard situated near a limestone formation should be eschewed, for the occurrence of fragments of limestone, or other calcareous matter, occasion the destruction of bricks, owing to the caustic lime formation during the burning. When this becomes moistened the lime slakes and tears it to pieces, an occurrence that might prove a cause of much trouble in a wall or support laboring under great pressure.

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French Professional Ethics. The annual calendar of the Societe Centrale des Architects Francais for the present year contains a statement of an architect's duties towards himself, his brother architects and contractors. The statement is signed by M. Charles Garnier, the president of the society which thus officially adopts it as a code. It defines an architect from the dictionary of the French Academy as: "The artist who designs buildings, determines their proportions, arrangements, decorations, causes them to be erected under his orders and controls the expenditure upon them." The architect therefore practises a liberal profession, not a commercial calling. His position is incompatible with that of contractor, manufacturer or furnisher of material in any way, and he is compensated entirely by fees to the exclusion of every other source of emolument resulting from his work or the exercise of his powers. If, therefore, he has taken out a patent for a product connected with building he does not exploit it himself, but sells it and all proprietary rights in it. Not being engaged in a commercial calling, he does not have any dealings which involve discounts or commissions, either received from those who wish for his patronage or given by him to agents and solicitors for capitalists or others whose patronage he himself desires. Nor does he seek publicity by advertising his capabilities in a commercial manner (which, we presume means to point to the impossibility of the same person fulfilling at the same time the role of self advertising for the purpose of making money and that, which he ought to fill, of a trusted agent acting entirely for the best interest of his employer without any other consideration coming in). In general the architect must have no dealings with any one which dealings must be a secret between him and his clients, either actual or prospective.

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As concerns his professional brethren: The architect refrains from hostile criticisms and does not aim at a situation or connection obtained by a confrere. If by the death, retirement or dismissal of an architect another architect is called to take up his work, the new architect considers himself as the guardian of the honor and interests of the former one. An architect recognizes the condition of brotherhood in the profession; he is careful to let the rules of consideration between equals govern all transactions between architects, such, for example, as arranging that meetings between architects shall be held in the office of the oldest without reference to standing of success. In the same way an architect treats young men obtaining their professional training in his office as members of his profession and lets them have the full benefit of his experience.

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In his relations with his client the architect devotes to him all his knowledge and gives opinions and counsels with entire regard to advancing the interests committed to his care. At the same time the architect does not allow his client to exact from him operations which would injure the rights of others, or which would compromise his client himself, or which would bring about accidents. In these cases he warns his client that he cannot fulfil his wishes. He also warns his client when his instructions are such as to increase the proposed expense of his work. He gives from beginning to end a clear statement to his client of what is proposed by the plans and what the estimates and tenders come to, and forwards to him all accounts when he has verified and corrected them. He is remunerated by his client and by his client only, without receiving anything from anyone else connected with the works. Even when the works involve services to another person the fee based upon this expenditure is paid by his client, who recovers the amount from the other party or parties.—In matters of litigation an architect declines to act as an expert in a matter in which one of his clients is a party. He declines to act as expert if he has already published an opinion upon the matter in litigation. If he is nominated as expert by a client, as, for example, in a question of insurance, he ceases to become the agent or representative of his client, and becomes merely an expert.

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Towards contractors: The architect is fair and disposed to smooth their work as much as possible, but, as before said, he has no dealings with them which place either them or himself under money obligations one to another. He deals promptly and openly with all accounts between them and the owners, but does not pay them unless he receives a special commission from his client to do so. When an architect has a contractor or body of contractors as client, he is remunerated by fees in precisely the same manner as by any other client, and does not become involved in any element of commercial speculation which may be connected with the work. An architect who becomes a contractor or the clerk of a contractor loses the quality of architect. He does not lose this in becoming the clerk of an architect.

R.C.A. Exhibition. THE MODELLER. E. Dyonnet, A.R.C.A.

Plans and Specifications. Many contractors, when making estimates of work on which to tender, will examine the plans and specifications closely with a view of discovering some flaw or some defect or omission whereby they may evade some of the conditions, and by this means fail to comply with the spirit of the architect's intentions. There would be but little use of specifications entering into details and descriptions if contractors were allowed to interpret every disputed point to their satisfaction, for it is quite obvious every interpretation would be in the interests of the contractor's pocket, and to the disadvantage of the owner. If the practice of evading written specifications and drawings were not so common, the subject might be left untouched, but, from what can be gathered, the practice of wilful evasion, or violation, is becoming so frequent that the matter requires consideration. To make this clear, a few instances may be cited by way of explanation. A certain contractor agrees to build a house, according to plans and specifications provided, for a stipulated sum. The plans have been prepared by an architect residing some distance from the contemplated work. The contractor persuades the owner that the plans and specifications are complete, and that the cost of inspection may be saved, as he—the contractor will see that everything is done properly. The owner consents, when a series of violations and evasions begin, that properly named would be called bare-faced robbery. The building is finished—according to the contractor's view—and the owner, to make sure that all is right, employs the architect, or some other competent person, to go over the building and to report. With plans and specifications in hand, the work is gone over, but paint, mortar, putty and sheathing have so hidden defective work and materials that the inspector cannot reasonably find fault with defects he cannot see, so orders some changes in the hardware, has a bolt put here, a sash-lock there, another step at the kitchen door, and a few shelves and drawers in the pantry, with a few more wardrobe hooks in the closets, and he has earned his

fee, while the owner is satisfied he has got a good job, and the contractor shakes hands with himself and pockets the profits he has stolen from the owner. A few years later the owner realizes the mistake he made in allowing himself to be persuaded to forego the services of a competent inspector, but he has no recourse—only, he never gives that contractor another job. Plans and specifications should be adhered to closely, and, though the architect may have erred in some small things, it is better—and wiser—to stick to the letter and the spirit of the plans, than to allow a contractor to change them.

ILLUSTRATIONS.

NEW LEGISLATIVE BUILDINGS AT VICTORIA, B. C.—F. M. RATTENBURY, ARCHITECT.

IN the CANADIAN ARCHITECT AND BUILDER for April, 1893, was published a rough sketch of the accepted design by Mr. F. M. Rattenbury for the proposed Legislative Buildings at Victoria, British Columbia, accompanied by a brief description. This design was submitted in a competition in which a large number of Canadian and foreign architects participated.

By the courtesy of the Premier of British Columbia, the Honorable Mr. Turner, and the Legislative Librarian, Mr. R. E. Gosnell, we are enabled to present, in this issue, from specially prepared photographs, exterior and interior illustrations of the completed buildings, which are designed in the Renaissance style and constructed of grey stone, quarried on Haddington Island, about 300 miles north of Victoria.

The buildings are roofed with slate obtained from quarries at Jervis Inlet. The granite steps and landings were obtained from quarries at Burrard Inlet and Nelson Island. Native woods and materials have, as far as possible, been employed throughout the work.

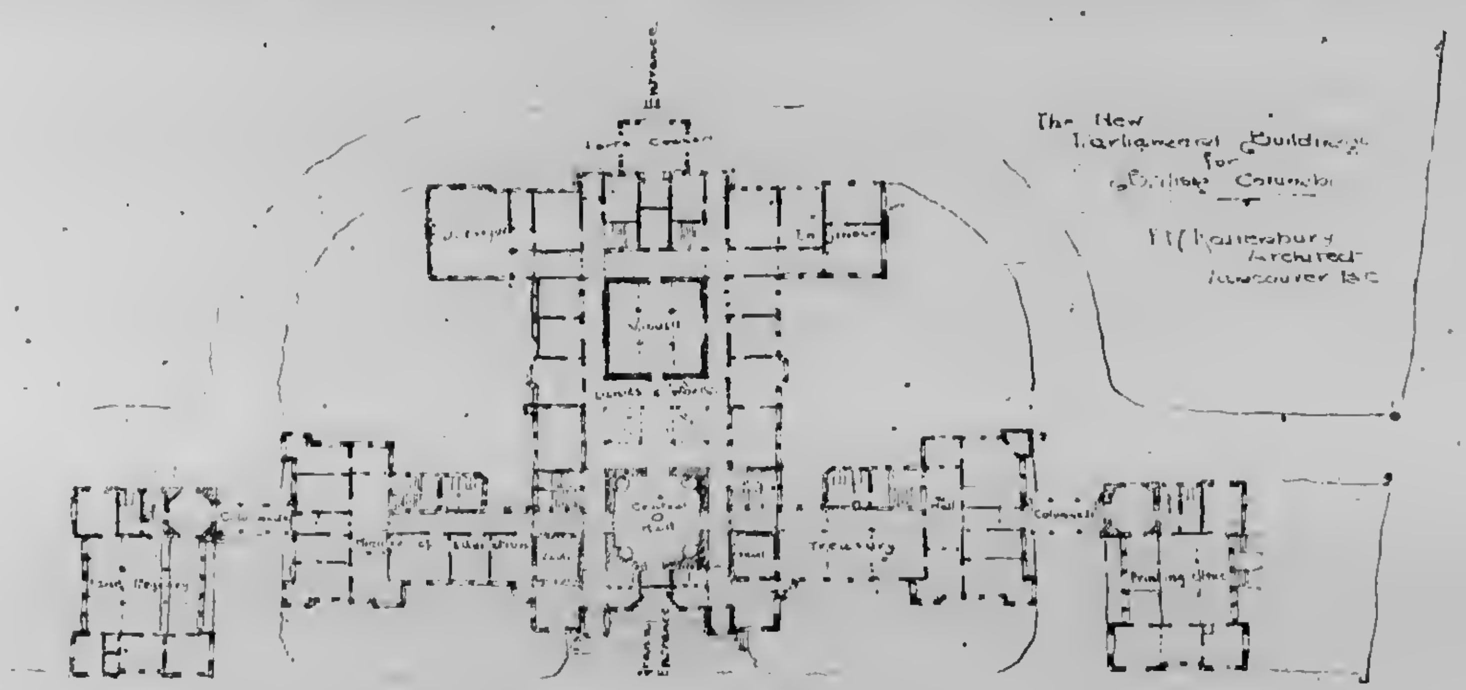
The buildings are arranged in three groups, so that while each is in itself complete, they are connected with each other by covered colonnades. The general arrangement of the building will be better understood by reference to the accompanying plan. It will be seen that, while each building has a separate entrance, yet direct access is obtained from the central main entrance hall.

The main entrance is reached by 44 steps, with two landings, and is flanked by two towers. On the left is a statue of Captain George Vancouver, an adventurous navigator, whose name is prominently identified with the early history of the North Pacific coast, and on the right by a statue of Sir Matthew Baillie Begbie, first Chief Justice of the province. It is ornamented with rich carving and guarded by wrought iron gates.

The rotunda, which is reached by this entrance, is octagonal in design, and surmounted by the dome, which is the principal feature of the exterior of the building. The height of this dome from the bottom of the foundation to the top of the surmounting figure is 165 feet, and the diameter 12 feet. The walls of the rotunda are lined with Tennesee marble to a height of 6 feet 6 inches, and at equal distances are square marble columns rising to a height of 30 feet. The floor is of mosaic.

The Legislative Hall is situated in the centre of the block, and has a corridor round it, with rooms for the use of the ministers and members, committee rooms, library, etc. On three sides an arcade is carried round, with galleries for the public and the press over the corridor. The Legislative Chamber is 61 feet long, by 39 feet 3 inches wide. A prominent feature is the solid Italian marble columns, 22 in number, extending along both sides and supporting the roof. These columns are beautifully variegated in color, the capping being black, the base a veined white and the columns themselves a rich dark green. They are surmounted by Ionic capitals and gilt scrolls. The walls between the columns are white marble. It is intended that the panels between the columns shall be filled in with paintings. The Chamber is well lighted from the ceiling by four dome-shaped lanterns, as well as by side windows.

On a level with the legislative chember are the Attorney General's apartments and the law library which are finished in native cedar. In the south-east corner are the quarters of the Provincial Board of Health, and in the north-west corner the executive council chamber, panelled in Indiana oak with oak parquetry; also the provincial secretary's department. On this floor is also located the office of the commissioner of lands and works, and in the basement below are large vaults in which are kept the records of this important department. In the north-east corner is the Department of the Premier and Minister of Finance and the Treasury Department.



At the approach to the three departments on each floor from the central hall, a system of iron doors or bulkheads is arranged, by means of which, should a fire occur, it can be isolated and controlled. The buildings throughout are to a large extent fireproof in character, a great deal of concrete being employed, and the use of wood in exposed positions being, as far as possible, avoided.

The rooms set apart for the use of the Lieutenant-Governor and his suite are located on the second floor, also the departments of agriculture and mines.

The west wing is occupied by the government printing office and the east wing is intended for a provincial museum.

From the central hall charming vistas are obtained down the arched corridors, the windows of which are filled with stained glass of excellent quality.

The buildings are heated by steam generated by Heine boilers, located in the basement. At present the lighting is supplied by the City Electric Light Company, but provision has been made for the installation of an isolated lighting plant. The heating system was installed by the Bennett & Wright Co., of Toronto.

The construction of the buildings was largely carried out by local contractors, under the superintendence of Mr. E. C. Howell, of London, England. Contracts were let for each trade separately, tenders being based on carefully prepared bills of quantities in accordance with the British system.

The total cost of construction, including furnishings complete, is given in the provincial year book as being under $840,000.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

A MISREPRESENTATION.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—In your June number Mr. Langton writes as follows: "Mr. Wells wrote a letter in your March number saying that the Ontario Association of Architects is wrong to advocate education for architects when what is wanted is inspection of buildings."

Mr. Langton is quite mistaken. I made no such assertion. The arguments advanced in Mr. Langton's reply to my first letter were based on this same false assumption. And in my rejoinder to his reply I endeavored to point out this fact. Since Mr. Langton persists in mis-stating my argument, and indeed waxes quite indignant that I should not be convinced and silenced by a reply that falls quite beside the mark, it is perhaps useless to continue the discussion.

By all means let the Ontario Association advocate education for architects in all ways and at all times. When have I said a word against it?

What I have said, and do say, is this: The prime object of the Ontario Association's existence has always been—and apparently still is—to obtain from the government power so that it may regulate various matters connected with the profession.

The CANADIAN ARCHITECT AND BUILDER contends that this power should be granted to the Association in the interest of public safety; I have tried to show that there are other more directly effective means of securing the public safety.

Mr. Langton declares that the architect must be educated; I have sought to point out that the highest education is obtainable in various ways, all quite independent of government-authorized machinery. While the champions of this legislation idea rely solely on arguments such as these, their case is surely not a strong one. And yet it is remarkable that they seem unable to get any further than this.

Anyone, ignorant of the history of the Association, and of what is the chief end of its existence, might read both of Mr. Langton's letters without once guessing that the organization in defense of which he was writing had the least ambition to exercise power in the regulation and restriction of the profession; much less would the ignorant one guess that the Association's desire for such exercise of power was the main object of attack by the correspondent Mr. Langton was engaged in answering. Indeed, the promoters of the legislation idea seem always to have thought it expedient to place much emphasis on some incidental benefits that the public have been encouraged to hope might result from the Association winning new powers; and no emphasis at all upon what the real nature and scope of these powers are to be. Yet this is the all-important question; and it is right that the Ontario government should think twice before delegating powers that might easily at some time or other be greatly abused.

Yours truly,

ARTHUR E. WELLS.

MUSKOKA, July 9, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

DEAR SIR: In Mr. Wells' letter, which you have kindly sent me, he comes out squarely as an opponent of the Ontario Association of Architects, on the ground that the real object of its existence is "to exercise power in the regulation and restriction of the profession." The only objection that can be taken to this ground is that there is involved in it an accusation of duplicity against certain well-known and respected architects who are serving or have served as members of the Council of the Association; for the avowed object of the Association is different from what he says is its real object, and we can only suppose that he conceives of the members of the Council as attending to its proceedings with their tongues in their cheeks. As a matter of fact, if this is Mr. Wells' only ground of opposition to the Association, there is no occasion for him to oppose it, for the Association has no object other than that which it professes to have, viz.: to establish in Ontario a profession of architecture in which all members of the profession must have the training which will enable them to practise the profession properly. The only way to attain this end is of course the usual way, of examinations on a standard curriculum, so that the Association is practically an educational body.

It has also one professional regulation: the agreement signed by all members of the Association, who sign the Register, that they will receive remuneration in connection with any work only from the client for whom they are acting in that work.

It might be a good thing to have a society which would regulate the profession more than this. It would probably do good at first, but might degenerate afterwards. In any case regulations are of the nature of medicine. It is better to make for the soundness of the body. It is in this direction that Mr. Wells will find the "nature and scope" of the powers which the Association has now in some degree, and which it has been seeking to improve.

To foster the architect; to make a professional man of him; to exact from him and towards him a certain standard of behavior, is one way of going to work; and perhaps it may be reasonably claimed that by thus improving the status of the architect, the quality of his work will improve. But who is sufficient for the demands of such a mode of regulation. A more certain way to improve the position of the architect, to give him all the recognition, honor and even emoluments which result from holding a place of importance in the world, is to foster architecture; to bring about the recognition of a high standard in what is required from the architect. This is a liberal policy, which no architect need be ashamed to support, nor need any legislator hesitate about giving powers to help on its execution.

The first step to its attainment is held by the Association to be a limitation in the use of the title "architect" to those persons who have passed a standard set of examinations, and have thus exhibited, perhaps roughly, but in the only effective way that has yet been conceived, that their general education and professional training is up to such a mark that they have at least the grounding found necessary for doing good work.

As Mr. Wells truly says, "the highest education is obtainable in various ways, all quite independent of government authorized machinery." This is quite true, but it is not the highest education here and there which will bring about the end advocated by the Association, but the attainment of a general level so fairly high that no man need fall below a certain point. This is the hope of architecture in Canada. We are not in the position of the older countries. We have no tradition, as they have in France and Italy. We are not surrounded by examples of the best periods of architecture, as they are in England, so that one may acquire, from constant association, ideas in unconscious progress, as we do our manner of speech. Everything that we know about architecture has to be learned, and it is necessary both to afford opportunity to those who know this and wish to learn, and an occasion to those who would not otherwise know what there is to learn.

As to the safety of the public, it is obvious that it is not the highest education of a few, but this same general level sufficiently high, that will furnish security to the public. Danger does not lie in tall steel frame buildings, nor in large public buildings where money is easy and an eminent architect is employed. It is the simpler practitioner who has to put the most strain upon his material, and he would be happier in his work, and take less risks, if a scientific training were thrust upon him before he began practice.

I remain yours truly,

W. A. LANGTON.

THE LONDON CITY HALL DISASTER.*

TORONTO, February 5th, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—After reading the article in your valuable journal of Jan. 1898, upon the above-named subject, I made a calculation of the strength of the broken beam with the following results, which I beg leave to submit to your journal, with a few remarks upon the actual strength of pine joists or beams under transverse loadings:

I make the area of the floor supported by the beam that failed about 308 square feet, equal one half of 22′ × 28′. Dimensions of beam 12″ × 14″, 21′ 6″ between the bearings.

Dead load on the beam would be about as follows:

308 superficial feet of 1¼″ flooring	963 lbs.
18 joists 3″ × 13″ × 15′	2,212 "
1 beam 12″ × 14″ × 21′ 6″, including bolts	800 "
308 superficial feet of lath, plaster, &c., &c.	2,700 "
	6,675 "

Moment of inertia of the beam $= \frac{b.h^3}{12} = \frac{12.14^3}{12} = 2744.$

If we assume the ultimate strength of the lumber in the beam, or of the average stock pine at 4000 pounds, which I believe is a fair allowance, the breaking load would be $= \frac{16.f.I}{L.h} = \frac{16.4000.2744}{258.14} =$ 48530 lbs. Substract the dead load from this, and we have

* The above communication, designed for publication several months ago, was unfortunately mislaid. Owing to its value, its present publication is deemed desirable.

48530 − 6675 = 41855 as the live or superimposed load necessary to break the beam.

In a beam of this kind nothing less than a safety factor of 4 should be adopted—a factor of 5 would be preferable. Therefore $\frac{41855}{4} = 10464$ lbs. as the safe load of the beam $= \text{to } \frac{10464\text{lb}}{308'} =$ 34 pounds per square foot of floor.

But from evidence given at the inquest we may assume that the strength of the beam was reduced about 25% by defects, such as knots, &c., so that the actual safe load the beam would carry was about 25 pounds per square foot of the floor it supported. Evidently some one made a bad guess when this beam was put in.

Whilst this sad accident is fresh in the minds of the public, would it not be a move in the right direction to interview the Dominion government and ask for an appropriation to pay the expenses of carrying out an extensive series of experiments upon the different Canadian lumber used in buildings, bridges, &c., such as struts, columns, joists, &c.

There is no reliable data to work from in the designing of wooden beams and joists, except the experiments carried out some 50 years ago on foreign woods one inch square, free from knots and all other defects. Such experiments are of little value, and not a fair representation of the strength of joists taken from the ordinary stock of lumber in general use.

A series of experiments made at the Watertown Arsenal, in the U.S.A., on full sized specimens go to prove that the data given by the early experimenters is not to be relied upon as correct for lumber in use at this date, the figures given being too high.

My impression is that it would be much safer to assume the ultimate strength of the outer fibres of pine at 4,000 pounds in beams or joists under a transverse load, and in designing beams or joists use a fibre stress of 800, 900, 1,000, 1,100 or 1,200 pounds per square inch as the case may require. The former would give a safety factor of 5 and the latter about 3½. With a higher unit stress than 1,200 pounds the deflection would be greater than good practice would approve.

In all modern specifications for steel beams a unit stress of 16,000 pounds per square inch has been adopted for the tension and compression flanges. This gives a factor of safety of about 3½ to 4. Now if it is considered good practice to adopt a factor of 3½ to 4 for safety in a metal that can always be got from the mills of a uniform quality, is it wise to use wood beams at a less safety factor, when we know that it is impossible to obtain lumber of a uniform quality and strength and without some defects.

In the United States tests above referred to, the transverse breaking strength varied between 3,400 pounds and 6,400 pounds per square inch. The quality of the lumber was good and free from large knots and other defects, but not selected.

If we take the average quality of lumber, I think 4000 pounds would be equal to the average strength.

It is to be understood that beams under the above mentioned fibre stresses, to be safe, should be braced by bridging or otherwise at intervals of about 20 times the thickness of the joists; and to avoid too much deflection the depth of joists may be got from the following: Multiply the length of beam in feet by 0.75 and the product will give the depth in inches.

Below I give formula for the safe loads of rectangular pine joists of symmetrical section:

For a fibre stress of	800 lbs.—f.	$\frac{b.h^2}{L}$	× 88.9	=	Uniform load.
" "	900 lbs.—f.	"	× 100	=	"
" "	1000 lbs.—f.	"	× 111.1	=	"
" "	1100 lbs.—f.	"	× 122.2	=	"
" "	1200 lbs.—f.	"	× 133.3	=	"

If these formula are followed we need not fear that another disaster would occur if a few dozen extra people crowded into a room at any time. b = thickness, h = depth, and L = length in feet. f = the fibre stress in pounds per square inch.

W. H. LAW.

The Board of Health of London, Ont., have adopted a by-law to regulate plumbing work in that city, and will recommend the same to the city council.

TEMPERING TOOLS.—Steel tempering is usually done in clean cold water; but Mr. Levat publishes the result of employing commercial carbonic acid to quench in, as a method practiced by him with greater success at the laboratory of the Faculty of Sciences, Paris. Two gravers made of Holzer steel were heated to cherry redness, and one was dipped in water and the other in carbonic acid. The superior physical qualities of the tool tempered in the new way were very evident on subsequent use.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

IMPORTANT amendments to the Plumbing By-Law of the city of Montreal have been prepared and have been read a first time in the City Council, as follows:

"Whereas, this council has been given power to establish a board of health and to grant thereto power and authority to take means to promote the health of the city, to provide precautionary measures against the introduction of diseases, etc.;

And, whereas, the existence, within the city limits, and especially within the densely populated districts thereof, of pit-in-the-ground privies is a menace to public health and a frequent cause of disease;

It is ordained and enacted by the said council as follows:

Sec. 1.—Paragraph (41) of section 4 of by-law No. 215, passed on June 4, 1894, and entitled "By-law concerning plumbing, drainage and ventilation of buildings," is amended by striking out all the words in the first three lines of said paragraph and by replacing them by the following so that the said paragraph reads as follows:

"(41).—No privy vault or cesspool for sewage, shall be, after May 1st, 1899, permitted to remain in any part of the city where water closets can, by means of a drain not over 200 feet in length, be connected with a public sewer in the street. When no sewer exists in the street, a permit for a temporary privy may be granted by the board of health; and in such case it shall be water-tight, of a capacity of 45 cubic feet; the sides and bottom shall be constructed of cemented brick, 12 inches in thickness and well cemented inside with hydraulic cement; such vault may be constructed of cast iron, the shape or form of which shall be either circular or oblong, without angles, and with a concave bottom; it shall be provided with a ventilation pipe at least four inches in diameter, extending from the pit through the roof sufficiently high as to prevent inconvenience to occupants of neighboring houses; the seats shall have a tight-fitting cover; it shall have an aperture opening exteriorly to allow of cleaning by pneumatic process, such aperture to be 2 feet by 1½ feet in size; or else the flooring shall be air-tight and shall have a tightly fitting trap door communicating with the pit; the top of the vault shall be one foot above the level of the ground; nothing shall be put into such pit, excepting human excreta; privies shall be located at a distance of 20 feet (or more, according as the board of health may deem necessary) from any house or street; they shall be emptied when the contents reach to within 18 inches of the top of the vault, by persons appointed by the board; no offensive smell or gases shall be allowed to escape therefrom. But, in no case shall a privy be allowed within the walls of a dwelling house or in any property situated in a street having a sewer."

Sec. 2.—The said by-law is further amended by adding, after section 5, the following:

"Sec. 6.—For each day after the first of May, 1899, that any privy vault or cesspool for sewage shall be permitted to remain within the city limits, in contravention of paragraph (4) as above amended, the owner of the property shall be liable to a minimum fine of one dollar, recoverable through the recorder's court on action of the health department or of any member of the board of health."

Sec. 3.—Section 6 of said by-law becomes section 7.

THE MORALITY AND ECONOMY OF COMPETITIONS.*

BY B. CRESWELL.

OF the figures which are here presented for the first time, I may say that they have been modified from what was originally hoped and intended of them. It was found impossible to discover the actual number and value of all competitions in Great Britain over such a period as should afford an unquestionable average figure of competitions in any one year, because a large proportion of competitions are only advertised locally. In England alone, I have it on high authority, more than half of all competitions are not advertised or noticed in the professional journals, and from my own investigation it was made clear that both in Ireland and in Scotland the tendency is to preserve and confine competitions to their respective countries, a circumstance for which, under existing conditions, we can scarcely be sufficiently thankful. One is inclined to predict that, if these two countries opened their doors, and our voracity for competitions did not flinch from the new undertaking, the profession would, figuratively, fall limb from limb and rot away.

The figures and facts hereinafter dealt with, therefore, must be regarded as having reference to England only, but even here they are inadequate to give any idea of the magnitude and extent of the system, for the already stated reason of the inaccessibility of local statistics.

It should be explained in passing that it is upon the basis of averages that the subject is to be here dealt with. The system has manifest advantages over that in which special cases are enumerated. It is a fairer method, because in dealing with so wide a subject a selection of special cases can be made to illustrate any assumption or point of view, and prove any desired conclusion. It is clear, because it condenses the whole field of the subject to a single representative item, and reduces the whole matter to its vital and primal element. It is absolutely necessary, in considering this subject of competition, to regard it in its wide and general bearing as affecting the profession and the art, if any profit is to derive from that consideration. To investigate it from the point of view of the individual competitor, and with an eye to his personal welfare or disadvantage, is scientifically absurd, besides being obviously absurd in many other ways as well. There is little doubt that this horrible incubus of competitions which torments the profession would never have grown to a serious harm if we had considered the matter in its universal and general bearing, and not in its personal and particular aspect. Competitions, therefore, will here be dealt with in relation to the profession as a whole, and a scheme of averages is used as being the most serviceable to that end.

The following figures, which are presented in the annexed table, are the result of a search through the files of the Builder, both in the advertisement columns and those of the body of the journal, and cover a period of two years. As has been explained, they refer to England alone. In the years 1894 and 1895 there are some seventy-one advertised public competitions, or, say, thirty-six advertised in each year. The average value of a building for which competitive designs are publicly invited is £9,000, so that the value of the buildings whose designs are made in public competition advertised in the Builder is about £324,000 yearly. The average value of the first prize (and premiums may be considered to be always offered, though there are solitary exceptions) is £56, and, besides, a sum of £52 is divided in smaller prizes. The average number of competitors I find to be about forty.

Now, the cost of making the drawings in a competition of the value of £9,000 may be fairly put at £30 for an average case, being eight drawings at £4 each. This sum does not cover the time of the principal, but the actual cost of producing the drawings. It is true that this cost cannot be at all exactly stated, because the amount of work put into competition drawings varies considerably, for obvious reasons. It is, however, a fallacy to omit in computing this cost, such items as rent, light, and general office expenses, on the ground that they would have been incurred in any case; and it is wrong to consider that, because the principal makes the drawings with his own hand, they have cost him nothing. If he had done this amount of work for some employer he would have been paid, and by doing it for nothing he may be considered out of pocket to the extent of the value of the work. Indeed, he has probably lost more than if he had employed an assistant, because, should he choose to work for his hire, he could command a higher price than what he would pay his draughtsman. The special committee of 1872 stated in its report that the cost of producing competitive drawings (irrespective of principal's time) varied from ¼ to 20 per cent., and from £2 to £800, so that an assumed average of £30 in a competition of £9,000 seems well below the mark. This figure gives an average expenditure by architects of £1,200 upon each competition, or an out-of-pocket loss in each year of £43,200. This, remember, only refers to such of the public competitions of England as are advertised in the Builder. I find a slight decrease in public competitions in the last twenty years; but this seems more than balanced by the mass of limited and local competitions.

Gentlemen, I am not going to amplify and emphasize the significance of these figures further. This phase of the subject has already been done to death. But I claim for them that they establish and demonstrate our competition system to be commercially rotten and unsound—that it is irrational; that from an economic point of view it is a monstrous anomaly, and that it is the occasion of expense and extravagances which could hardly be justified even if the possibility of the system was shown to be widely beneficial to the dignity of the profession and the distinction of the art. This, however, is not the case. Our system of competition as a policy is so disastrous to the status of the practitioner, and so enervating to the art itself, that even if the economic considerations were satisfactory, and the system beneficial to the pockets of the profession, it could still be shown desirable that the system should either be abolished or entirely reconstructed. This question of policy may be considered quite apart and aside from the economic question, which we have now done with, but it is necessary to explain that the remarks and the conclusions proffered in this and the following columns, do not refer to those large public competitions for valuable and important buildings which are published and discussed by us all, but to the general ruck of competitions, including limited and local competitions, which are here designated and included in the term "our competitive system." Public competitions for national and monumental buildings, in which the best established and most reputable of our architects take part, must ever stand in a very different light, and be viewed with a very different sentiment, from that which is roused by the wild, tumultuous disorder of the common herd of competitions.

It seems to be assumed by many people that competitions are a means to the end—building. This, of course, is not the case. It is, indeed, conceivable that the noise and excitement of a competition in a small township may stir up and inflate the emulation of the bigwigs of neighboring towns, and infect with the fever of building those who otherwise might have remained spotless of the disorder; but this is too fanciful and conjectural to be seriously debated. The fact is that a certain number of buildings will be raised in a given year, and we may consider the existence or otherwise of our system of competitions to have no weight in deciding what that number shall be. This complex mechanism of public competition exists solely to determine which precise architect shall be employed to carry out this or that individual work; and after fifty years of this struggling and grunting and tearing and fighting among ourselves, it is still found that the architects of England have raised England's architecture—precisely the same state of things that would have been effected without competition, in peace and goodwill. Our competition system has crowded the profession, and crowded it very largely with ineptitude. In these days we all go in for the grand handicap for premiums before we know how to run. It is a scramble wherein all sorts of unlikely people come in first. The opportunities for a young man to find a standing in the profession by a single stroke of good fortune induces many to enter the profession who would not dare to face the long stern path by which alone success is usually to be sought. They are dazzled by a game wherein success relies so little on sterling ability, and so much upon the chance circumstances of prejudice and bad taste in ignorant people.

The policy of the system is detrimental also to the art of architecture, as well as to its practitioners, because it effects that the selection of architectural designs shall be made precisely by the class least qualified to form a right judgment. The class who acquire the right of selection under the system—the hanging committee in the gallery of architecture—are not merely ignorant, but they are saturated with the most blatant forms of vulgarity. Our competition system has secured that a large and important division of our national architecture, shall interpret and immortalize the ideals and aspirations of precisely the most degraded and insignificant class intellectually in the country; a class that is educated in positive ignorance, and cultured in execrable artistic proclivities and tastes. It is not, unfortunately, a case merely of

* Abstract of a paper presented before the London Architectural Association.

callousness or indifference; the rural town councillors of remoter England positively select with a rare pains and discrimination the worst designs—not merely or necessarily the most hideous and ineffective, but just those which are most laden with studied assumptions they cannot support, which pretend to qualities above their kind and station, and which cry out their sham importance—precisely those designs which are least fitted to exist, which most insidiously degrade and pollute the morals of all who pass beneath their walls. The custom is to speak in fulsome terms of the enobling influence exerted upon the mind of man by true and refined architecture of lofty aspirations. If this be a just and true estimate of the potency of architecture to influence and modify the ever-changing moral tendencies of a people, and I do not think many will dispute it, we are entitled to apply the reasoning to the other side of the picture, and turn our attention to the false and mean qualities which characterize the greater part of our architecture. What horrors of infamy then do we not see being daily inculcated at our street corners, gentlemen, and what iniquitous deeds must be those performed in the trades of our bricklayers, masons and carpenters. And of these insidious stimulants to moral degradation, which are daily rising inch by inch throughout the country, some of the most evilly-intentioned are those raised in public competitions. The influence of these to undermine the pure motives of humanity in those whose life is spent under their shadow is the stronger and the more to be deplored, since the buildings hold a significance in being for the most part public buildings, the property of the township. The sermon of their stones is preached from an authorized pulpit. It is sufficiently melancholy that that class which, as has been said, is cultured in a positive ignorance of matters relating to art, and which is permeated with the undignified instincts and ambitions of small trade, should hold the privilege of perpetuating these deplorable instincts and ideals in the majority of the public monumental buildings in England; but it is a great deal more melancholy that architects (in acquiescing in a system of competitions which grants these unfeeling creatures the choice of some forty designs) should have added the privilege that enables them to secure a design which portrays their own meagre commercial instincts, and their motives of brag, assumption, and self-advertisement much more thoroughly and effectively than they could reasonably have hoped to obtain from a private architect. It is true that an assessor is most usually appointed, but it is certain that he has little authority with the average town council upon a question of design, and nearly all conditions of competition expressly state that his award is not held binding upon the promoters, as will be shown hereafter. The tendency of our deformed system is to secure that a great deal of architecture is soundly and thoroughly vile, which otherwise might have been merely weak and poor.

There is a general approval of competitions on the ground that they give young men an opportunity of showing their worth. I have heard them called "the young man's friend," a touching phrase, which, however, lost in pathos from being employed by a young man who wins competitions. As, however, a young man must look to compete forty times for every first award he wins, we may rather consider them the "young man's enemy," for it is appalling to think of the host of young men who have thrown away their best energies and hopes in the preparation of useless drawings. The great names in art are not altogether those of men who have risen to acknowledged supremacy in early life, and early success is usually vastly detrimental to the artist. The very essence of true power is that it shall come of long vigils of self-denial and long years of self-contained labor. A genius usually has to make his own public. In these days the matter for remark is not slow acknowledgment of worth, but rather the numbers of men who spring into superficial notoriety, and who are never again heard of, or whose names are never associated with any admirable or commendable work. This is because men spring into notability upon specious and meritrecious qualities. Merit is content to wait; demerit is not. The men who are most successful in their professional life, in their art, are those who start without fallacious incentives, false aids, and without haste, and without greed of those rewards of acclamation and patronage which is the gift of the discerning British public.

It is a common usage to exclaim against the promoters of the competition when there has been inequitable treatment of the competitors, or a precedent has been made in new irregularities. This, however, is unreasonable. Competitions are not a matter of philanthropic consideration—there is no suggestion of philanthropic motives or of mutual concessions for mutual benefit. In any other transactions involving such large outlay and such weighty consequences, the architect, in common with his fellow-citizens, protects himself according to commercial usage, and there is no reason why he should make an exception in the case of competitions. A town council desire something for which it is prepared to offer certain moneys or advantages, and architects, by accepting those terms, have committed themselves beyond dispute as being satisfied with them. The promoters, regarding the matter solely as a commercial or business enterprise, can only suppose, from the rivalry and enthusiasm the competitions evoke, that they are esteemed and valued of the profession. It is no conspiracy on the part of the public, of the promoters, that has led to this lax and lamentable state of affairs, but a conspiracy of greed and weakness on the part of the profession.

The conditions of competition as now drawn up may be in general very fairly described as a sham legal instrument; it is a sham form of contract wherein the obligations of the competitors are clearly and exactly defined, and the obligations of the promoters set in such loose, ambiguous terms as render them open to any interpretation that subsequent events may show to be most profitable to the promoters. The conduct of a public or limited competition is clearly a matter of contract, and it is the business of each party to see that his interests are properly protected in its terms. It is, therefore, weak and foolish for competitors to cry out and protest when they find that they have the worst of the bargain. It is usual in such cases to charge the promoters with having broken their word, with having falsified their explicit undertakings, but surely redress for such injury as is here claimed lies not in the sympathetic columns of the professional press, but in an action at the High Court. The truth is, however, that it is very rarely that promoters of competitions go back on their precise undertakings or falsify their explicit promises. This is not for any qualms of sentiment or conscientious scruples, but for sheer lack of any precise undertakings to go back upon, and utter dearth of any explicit promises to falsify. When an assessor's award is set aside, or when the winner of the first premium is supplanted in his commission to do the work, there are invariably long and loud protests; pathetic appeals to common honesty and fair treatment from us poor architects, who forget our greedy rivalries for the moment and are bound in one common sympathy of misfortune. Someone read a paper once on "Professional Etiquette." One does not think it could have been unduly long. This common misfortune may be described as the only bond of sympathy still existing among us. But to keep to the subject of conditions of competition, I have drawn up a table which enables me to substantiate what I say. This table gives the gist of thirty-two conditions and instructions, as sent to competing architects, taken haphazard from the portfolio lately instituted for this purpose, in the library of the Royal Institute of British Architects. Upon this basis I find that in 50 per cent. of cases an assessor is appointed, that in 77 per cent. the premium merges in commission; that in no case is the winner of the first premium promised the work, but that, on the contrary, 54 per cent. state that the committee is "not bound to accept first award," and 35 per cent. state that they do not bind themselves "to accept the first or any design." That in no case is the assessor's award stated to be absolute, but that, on the contrary, in 100 per cent. (estimated on a basis of thirty-two instances) of the cases it is expressly stated or clearly implied that his award will not be absolute—that the committee do not hold themselves bound by his decision. I may also call your attention to other little delicacies offered, where the thoughtfulness of promoters is again instanced. In order to mitigate the fevered enthusiasm and passion of emulation with which they have noticed we fling ourselves into competition, they have docked the commission in some 16 per cent. of the cases by making the 5 per cent. include quantities or other extraordinary expenses. I also discovered four cases where no conditions existed at all, and also a little gem, where there was no premium offered, and yet another, where the ten guinea premium was to merge in commission if the work was carried out within five years.

I submit, that of the general ruck of competitions not one grain of professional or artistic enthusiasm has place—if enthusiasm may be estimated in grains. The desire to compete is born of unrest, worldly ambition, weak unbalanced inclinations and false hope bred of an incontinent longing for the plums of life before the just harvest time: to be got, not legitimately, but by a short cut. Every one knows that the knack of winning competitions is not the knack of design. Even Sir Gilbert Scott admitted that his designs made in competition were necessarily different from those he would have made for a private client. Professor Kerr has insisted that the man who wins is the man who gets the best

information from the best source. The ordinary competitor does not think of consequences, or he would not compete. He is buoyed by excitement; and it is this memory of his intoxicating excitement which prompts him and entices him to further risks. It is no use or purpose to show him that it is forty chances to one against his winning—any more than it is to tell these things to the gambler or the betting man. The whole circumstances of the ordinary architect is that of a gambler making a big stake.

The whole atmosphere and environment of competitions is corrupt. I know personally of a competitor who was approached frankly—unreservedly—indecently—by a member of a promoting committee in a late competition. The committee-man inquired whether he wished him to work for him on committee.

Can anyone believe, until he has eradicated from his mind the whole field of competitions, that architecture is either a profession or an art. Let me tell you the true and fascinating story of Durham, it is not a very old story, but it will bear a lot of re-telling when we wish to be stung to the recognition of the melancholy status of the profession. I especially tell the tale in reference to the question, is architecture a profession or an art? It will be observed that it is a case which rises out above the general run of competitions to which my remarks heretofore have had reference. In other words, it is an exceptional case, above the average in value and importance.

To begin with, any architect entering for this Durham competition, promoted by the County Council of Durham, had to pay a fee of £5 before he could know upon what precise terms he was humbugged. This is a common expedient with promoters to stave off the first mad rush of the architects. The assessor selected six designs, from which he made the final selection of his awards. The committee paid the first premium, awarded a local architect the second premium, and gave the latter the commission to execute his design. This local firm's design was stated not to have been included in the six designs of the preliminary selection. Then the profession made a strong stand. It got right on its hind legs. It objected. It objected in the professional press; it objected in printed circulars sent to the Council. Fourteen of the competitors signed this circular letter, praying that the winner of the first premium should be appointed to execute the work. They also pointed out that not only was the local firm selected by the Council not included in the first six, but that his design should, under the conditions of competition (for the luxury of which they had staked £5 each) have been disqualified. This memorial was sent individually to each member of the Council, shortly before the meeting which was to make the final irrevocable decision, with the intention, we may presume, of sapping their native resolution with such a show of firmness. Our powers of objection now became almost inspired, and certainly beyond human precedent. Two of the competitors, solemnly appointed and deputed by vote of them all, went and took residence in a hotel close by the building in which the Council were to meet. Think of it! Two live competitors at hand, in a hotel, in person to bring shame to the naughty councillors! Notification that these two protesting professionals were actually in situ at the hotel was duly sent to the Council. One regrets to say that there is no evidence of the Council having winced in bulk at this ominous news. We can fancy the pallor-stricken subordinate official bursting upon the elect councillors of Durham with the extraordinary intelligence. One has tried to realize the terrorizing effect, or the persuasive influence of a brace of protesting architects in a hotel, inviting there inspection and examination from the townspeople. One has altogether failed. One can hardly picture anything funnier. Our profession is content to go out to battle with a glass tube and a mouthful of rice, instead of having recourse to the solicitor's letter, which is usually employed. The result of this venture was that the Council said that they claimed legal right on the conditions of competition, and further, that the disqualifying features in their awarded design had not been brought under their notice, while a noble Lord who had got washed up on to the Council in the late high tide of municipal aristocracy, denounced the protesting brothers' cause as "a professional squabble."

What else than something of this kind we could have expected to get from the Council it is not very easy to imagine. The protesting brothers seem to have appealed to the Council's sense of justness, to its goodness of heart, and so forth; which, in face of the printed regulations accepted open-eyed by each competitor, was quite beside the mark, and an affront to both the understanding and the feelings of the Council. Apparently the deputation of protest expected to be answered somewhat as follows: "Gentlemen, we have been touched by your appeal to our good nature and sense of poetic justice, and though we were careful in the "conditions" to secure a free right to appoint whoever we might choose, yet your eloquence has shown us so clearly how base and shameful our motives were, that we herewith withdraw our decision, and agree to do what you wish." Unfortunately, side by side with our objectors' words of appeal, was the complacent admission of the assessor, who told the Council that "of course they were not bound by his award."

And now, gentlemen, bearing this scene in mind, is architecture a profession or an art?

A very great number of suggestions have been made for the

ANALYSIS OF THIRTY-TWO CONDITIONS OF PUBLIC COMPETITION, AS ISSUED TO COMPETITORS. TAKEN AS THEY CAME TO HAND FROM THE PORTFOLIO AT THE LIBRARY OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

Value.	Premiums.	Assessor.	Premium to Merge in Commission.	First Award to Execute.	Drawings Property of Committee.	Assessor Absolute.
—	50.20.10	Yes	Yes	Not bound	1	No
—	20.10	Yes	Yes	" "	1 and 2	No
500	10.5	?	Yes	" "	1	No (5 per cent., including quantities.)
(over 9,000)	50.25	No	Yes	" " Nor any	1 and 2	No
4,000	30.20.10	Yes	Yes	" "	1, 2 and 3	No
3,500	25.10	No	Yes	" "	1 and 2	
1,800	20.15.10	Yes	No	" "	1	No
30,000	100.50.25.15	No	Yes	" "	1, 2, 3 and 4	
5,000	30 and 20	No	Yes	" " Nor any	—	
15,000	50.30.20	Yes	Yes	" " " "	1, 2 and 3	No
5,000	30.15	Yes	Yes	Yes: if competent	?	No
—	20	No?	No	Not bound. Nor any	1	No
2,500	20.10	No?	?	Designs only asked	1 and 2	No
16,000	75.50.25	Yes	Yes	Not bound	1, 2 and 3	No
—	None	No?	?	" "	Yes	No (5% to include travelling, attendance at board, extras on contract, &c.)
300	7/10.2/10	No	?	No mention of execution	1 and 2	
—	—	—	—	No conditions	?	
?	20.10	No	Yes	Not bound. Nor any	1 and 2	No
5,500	50.35	Yes	Yes	" " " "	1 and 2	No (5%. No. expenses.)
?	150.100.50	Yes	Yes	" " " "	1, 2 3	No
4,000	25	No?	Yes	" "	?	No
?	40/10	Yes	Yes	" " Nor any	?	No
7,000	40.20	No?	Yes	" "	1 and 2	No
4,000 (about)	—	—	—	No conditions	—	
7,800	—	—	—	" "	—	
4,500	50.20	No	Yes	Not bound. Nor any	1 and 2	
9,000	50.20	Yes	Yes	" "	1 and 2	No
15,000	50.25	Yes	Yes	" "	1 and 2	No
4,000	—	—	—	No conditions	—	
7,500	—	—	—	" "	—	
7,000	40.20	No	No	Not bound	1 and 2	
8,000	—	—	—	No conditions	—	

THE AVERAGE ENGLISH PUBLIC COMPETITION.

Computed from the basis of seventy-one English Public Competitions advertised in the Builder in the years 1894-5*; from particulars of these same competitions subsequently appearing in the body of the journal; and from an analysis of thirty-two "conditions of competition" (see other table).

Value.	Premiums.	Competitors.	Promise of Assessor.	Premiums to merge in commission.	Promoters "not bound" to accept "1st award."	Promoters "not bound" to accept "1st or any award."	All Premiated Designs Property of Promoters.	The 5 per cent. commission to include extraordinary expenses.	Assessor award admitted to be absolute.
£9,000	1st £56, other prizes to value of £52.	40	Over 50 per cent.	77 per cent.	54 per cent.	35 per cent.	73 per cent.	16 per cent.	Practically never.

* It is not meant that each item has been worked out from seventy-one cases. Full particulars of every case were not to be obtained, but the number of cases yielding each figure was sufficient to guarantee accuracy for round numbers.

amelioration or reorganization and reconstruction of competition, but, so far as I know, no one has suggested that we should, in the matter of competitions, individually regard architecture either as being a profession or an art, or both, and that we should return to that attitude of independence with which it is hoped most of us left school or college, and which was ours before we were enticed to the attitude of the emulative haber-dasher soliciting some one's "valued order." We are wont to deal with matters relating to a private commission from a quite different standpoint to that from which we regard competitions; but I think few of us will deny that the wide generality of local competitions has spoiled our clients; and I think you will agree that the ordinary man who has not the advantage of a private fortune or a circle of the right sort of friends is almost compelled to submit to humiliating treatment from his prospective clients.

For my own part, I feel strongly against turning the profession into a sort of trades' union, yet most of the remedies which are suggested imply that, or tend to that end. The matter lies in our own hands. Our disordered competition system is a monument to our incontinent unthinking greed and folly. We have overreached ourselves, and we must retract and amend, and bring matters back to a position of ordered decency.

The power lies chiefly with assessors, because they are few, and because they are men of substance and position. It should surely be with them a sine qua non for their sanction of conditions of competition, that the terminology is legal and free of ambiguity, and that the various clauses are fair and reasonable. There is a very strong general disinclination to enter a competition where an assessor is not employed. Let it be noticed and understood in the profession that the assessor is a guarantee that the "Conditions" is a legal document, and that the clauses are fair and reasonable in the circumstances (which at present is far from being the case, as we have seen), and it will soon be difficult to get any one to enter a competition where this guarantee is wanting. This may not do much to ameliorate the radical false basis of the system, but it will mitigate its corruptions and irregularities; and it will enable these affairs to be enacted with such decorum as befits an occupation which is only uncertain whether it is a profession or an art.

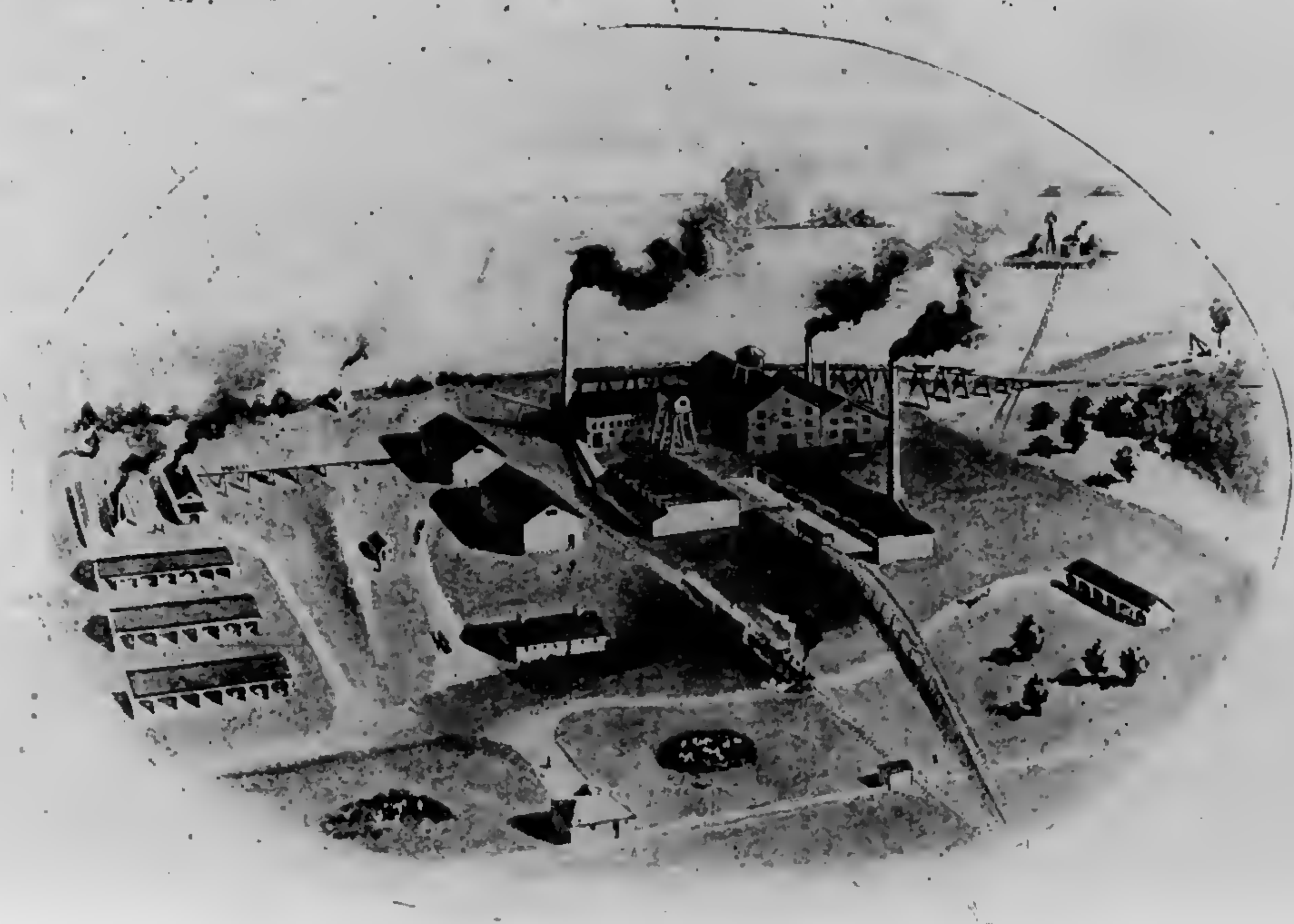
The excellence of the cement made by this company is largely due to the very superior quality of the natural ingredients, which are apparently better adapted for making Portland cement than groundstone which is more commonly used.

The original works were destroyed by fire a few years ago, and have been replaced by large and more commodious buildings and modern kilns, built after the plan of those used in English factories. Every department of these new buildings was fitted with latest designs of improved machinery known in the art of cement making in England, Germany and the United States, and to which additions are being continually made, till from the very modest start made in 1888, the buildings now cover a space of over two acres and have cost the company over $200,000.

The company have their own stave factory and cooperage plant and manufacture their own barrels at the works. An efficient chemist is continually employed, and every kiln of cement is carefully tested before leaving the works for the storage department.

The capacity of the factory has this year been increased from 130 barrels to 300 barrels per day. The company employ an average of 80 men throughout the year and have storage capacity at the works and in their warehouses at Toronto and Winnipeg for 40,000 barrels. The present demand for Sampson cement is so great that they are quite unable to supply their customers.

Twenty-three tons of coke are consumed daily in burning the clinker preparatory to grinding into cement, and 2,000 cords of wood are annually used in making steam. The company own their own electric light plant and the works are well lighted inside and out throughout the entire year.



WORKS OF THE OWEN SOUND PORTLAND CEMENT COMPANY.

OWEN SOUND PORTLAND CEMENT CO., LTD.

IN 1888 this company was formed in Owen Sound with a capital of $100,000. The natural deposit from which they are now making their well-known "Sampson brand" Portland cement, is situated at Shallow Lake, 9 miles west of Owen Sound, on the G. T. R. The deposit covers 500 acres, forming the bed of Shallow Lake.

The water recedes from the lake early in June, usually not rising again till late in the fall. During this dry period the company put on teams and scrapers, and take out first the marl and then the blue clay which underlies the marl. In removing the clay a steam derrick is used to elevate the clay into dump cars in which it is hauled to the works, which are located above high water mark on the shore of the lake.

Since this company began operations the price of Portland cement has gradually decreased and many failures have been recorded in England and the United States as a natural consequence. The price of cement to-day is nearly fifty per cent. lower than it was ten years ago. The company state that while profits have been small—in fact, no profits at all—through unfair competition of light weight barrels, adulterated and often useless brands of cement, and public prejudice in favor of imported goods, their aim has continually been to improve their Samson brand, until now they confidently challenge the world to produce a better cement, and hope in the near future to be able to raise the price to a more profitable figure.

For proof of the excellent quality of the company's material we are referred to the following results of tests made in comparison with well-known brands of Belgian and German cement:

Lion Brand (Belgian)—(1) Fineness, 75% passed a 100 mesh sieve. (2) Blowing test, in water at 108° F. for 24 hours; unsound; blown all to pieces. (3) Tensile strength, 7 days, 90 lbs. per square inch.

Stetha Brand (German)—(1) Fineness, 90% passed a 100 mesh sieve. (2) Blowing test in water at 180° F. for 48 hours; sound. (3) Tensile strength, 2 days, 337 lbs. per square inch; 7 days, 505 lbs. per square inch.

Samson Brand (Canadian)—(1) Fineness, 93% passed a 100 mesh sieve. (2) Blowing test in water at 180° F. for 48 hours; sound. (3) Tensile strength, 2 days, 345 lbs. per square inch; 7 days, 565 lbs. per square inch.

THE BUILDER

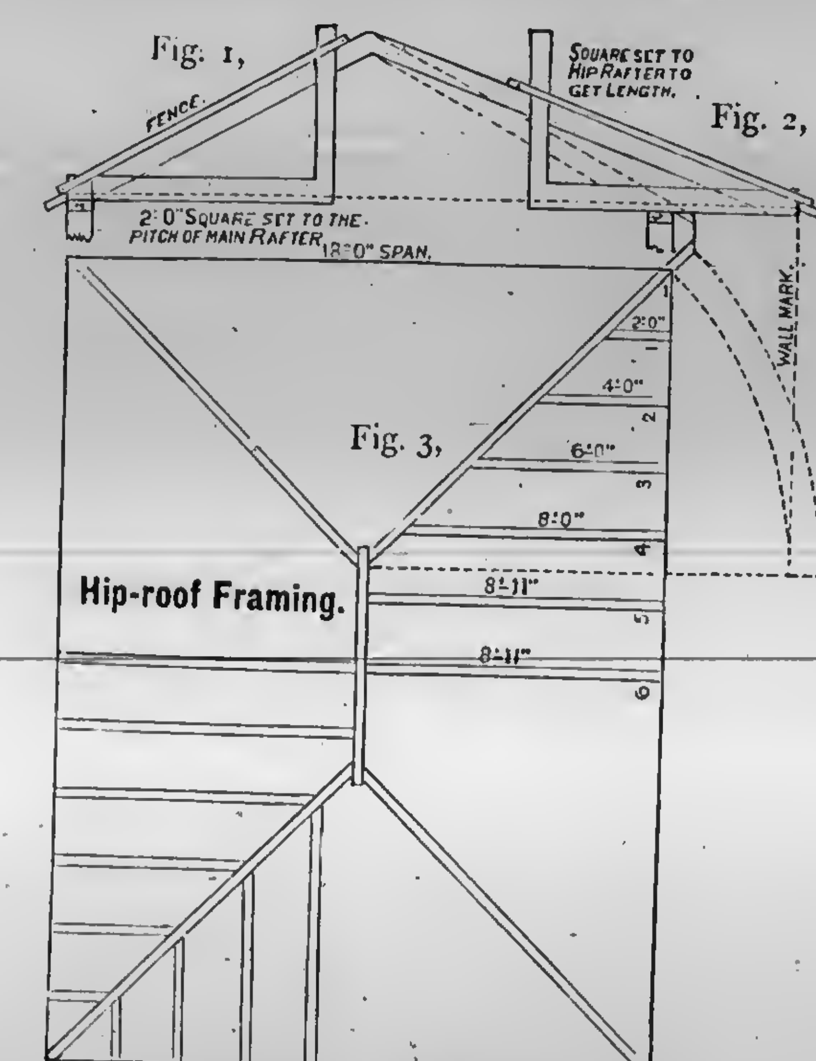
[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Something About Shingle Roofs.

THE average life of a shingle roof was formerly placed at twenty-five years, but recent observations have proved that the modern shingle roof does not live more than fifteen, and oftener, ten years; and in many instances roofs that were shingled twenty-five or thirty years ago hold good, while neighboring roofs required re-shingling once or twice during the same period. Two reasons are given for the early decay and wear of the modern shingle. Latterly, shingles are made from fallen or burnt timber, and have but little life in them when cut into bolts. The lumbermen and mill men cut everything into boards that will make boards or dimension stuff, and the culls, dozey butts and defective fragments of logs and burned timber are made into shingle bolts. The result of this system is that a large majority of the shingles that find their way into the market are half decayed before they are laid on the roof. Under proper architectural supervision such shingles would not be permitted to be used, but, when the contractor is also the architect or superintendent, his interests are in the direction of cheap, and consequently, inferior shingles. Another cause of early decay in the modern shingle is that, as a rule, roofs are not now built with the acute pitch they were twenty or thirty years ago. A shingle will not last as long on a flat roof as on a steep one. The reasons are evident. The roof that sheds the water the quickest, dries the quickest, and lasts the longest. The pattering of the rain does not cut the shingles as it does on a flat roof; and under every condition a steep roof is less likely to leak than a flat one, and in case of a fire in adjacent buildings, a steep roof stands a much better chance of escaping than one having a flat roof. It could be demonstrated by algebraical rules that, the steeper the roof the longer it lasts, and a solution of the problem shows that, to get fair results, a roof should never be less in height than half the width of the house—that is, one-half pitch. A quarter-pitch roof, unless used on a cottage roof with hips, though a common roof in Canada, should not be employed if it is to be shingled, and further, it is offensive to good taste and is constructively bad, even when tied with collar-beams.

Hip-Roof Framing.

CONTINUING our remarks on the use of the steel square, we take up the question of hip-roofs. Suppose the pitch shown at Fig. 1 in the diagram, where the square is applied, is described on the architect's plans and specifications. Then the end of the blade of the square must only just enter the fence, as shown, and the tongue be adjusted to the pitch of the roof, whatever that may be. Fig. 2 shows the square set to the pitch of the hip-rafter. The two squares as set give the plumb and level cuts. Fig. 3 shows the plan of a house 18 × 24 feet; the rafters are laid off on the level, and measure nine feet from centre of ridge to outside of wall; there should be a rafter pattern made, with the plumb cut at one end and the foot cut at the other. When the foot is marked off, place the end of the blade to the wall line, as shown in the diagram, and mark across the rafter at the outside of the tongue, and these marks on the rafter pitch will correspond with two feet on the level plan; slide the square up the rafter and place the end of the blade to the mark last made, and mark outside the tongue as before. Repeat the process until nine feet are measured off, and then the length of the common rafter is correct, with the exception of half the thickness of the ridge-piece, which must be cut off the point of the



rafter in the plumb-cut. The rafters are laid off on part of the plan to show the appearance of the rafters in a roof of this kind; but for working purposes, the rafters 1, 2, 3, 4, 5 and 6, with one hip rafter, is all that is required. For the hips and jack rafters, lay off a common rafter as explained, but make the pitch one-third; that is, raise the ridge above the level of the wall plates one-third the width of the building. This pitch is obtained by employing the figures 8" on the tongue and 12 on the blade, which gives the length of one foot on the plan, and the plumb and level cuts. Next is the hip-rafter.

If we take 12 and 12 on the square, the diagonal line touching these figures will be 17 or thereabouts, and the hip is the diagonal of a square added to the rise of the roof; therefore, we take 8 on the tongue and 17 on the blade, run the same number of times as we would for the common rafter (rule to find distance of hip diagonal, $a^2+a^2+b^2=y^2$). To cut jack rafters, divide the number of openings or spaces for common rafters. If we have five jacks, with six spaces, our common rafter being 12 feet long, each jack would be two feet shorter; first 10 feet, second 8 feet, third 6 feet, and so on. The top down cut for jacks is the same as the plumb cut on common rafters; the foot cut is also the same as in common rafters. To cut the mitre to fit the hip, take half the width of building on tongue and length of common rafter on blade, and blade line gives the cut. Now find the diagonal of 8 and 12, which is 14.42—call it 14 7-16; take 12 on tongue and 14 7-16 on blade; blade line also gives cut. The hip should be "backed" or beveled from centre to suit line of jacks. Take height of roof on tongue, length of hip on blade; tongue line gives bevel from centre line of hip. These figures will cover all cuts for cornice and sheathing. For bed moulding which is cut on the rake, take half width of building on tongue, length of common rafter on blade; blade line gives cut. It must be remembered that machine-made mouldings will not "member" properly on a rake, no matter at what angle they may be cut, but the method given will make a solid joint, when the moulding may be pared to "member." To cut planceer to run up valley, take height of rafter on tongue, length of rafter on blade; tongue line gives the cut. For the plumb cut, take height of hip-rafter on tongue, length of hip-rafter on blade; tongue line gives cut. These rules give cuts and bevels for roofs of one-third pitch, regardless of size of building. Other pitches may be treated in a like manner, but of course the figures will be different.

Estimating Number of Joists, Studs, &c.

A BUILDER asked us the other day if there was not some simple and rapid way of finding the number of joists, studs, furring, etc., for any given length of floor or wall, where the centres were placed sixteen inches apart. The solution is quite simple: Multiply the length of the building in feet, by 3, and divide the product by 4. For instance, a building is 124 feet long, then $124 \times 3 = 372 \div 4 = 93$, the number of joists or studs required. This rule holds good no matter what the thickness of joists may be, as long as they are spaced 16 inches from centre to centre. Allow one extra always for a starter, except where a sill or other timber forms a starter. The same rule applies also to furring or strapping, or any other work, when 16 inches form the distances from centres. In estimating the number of rafters or other timbers that are set 2 ft. 6 in. to centres, results may readily be obtained by multiplying the length of building by 2 and dividing the amount by 5. The result will show the number of pairs of rafters required, less one pair, which must be added. Again, if we want to place joists or timbers of any kind eighteen inches from centres, all we have to do is to multiply the length in feet by 2, and divide the product by 3, pieces required less one, which must always be added. In the first instance, the foot is divided into three parts of 4 inches each, and in the two latter examples the foot is divided into two parts of 6 inches each. The principle is quite plain, and when properly understood, may be applied to many cases in estimating.

Weights of Windows, Doors and Blinds.

IT frequently happens that a contractor desires to know the weight of doors, blinds, sashes and other wrought stuff, in order that he may be able to provide for railroad expenses or other freight charges; and the following tables have been prepared to meet such requirement:

WEIGHT OF DOORS.

Size.	Thickness. 1 Inch.	1¼ Inch.	1½ Inch.
2 ft. 0 in. x 6 ft. 0 in.	20 lbs.	25 lbs.	32 lbs.
2 6 x 6 6	27	33	38
2 6 x 6 8	30	35	40
2 10 x 6 10	33	40	45
3 0 x 7 0	36	45	50

WEIGHTS OF WINDOWS.

Thickness, 1¼ Inches.

Size of Glass.	Glazed.	Unglazed.
7 x 9—12 light sheets	13 lbs.	6 lbs.
8 x 10 "	15	6½
9 x 12 "	20	7½
9 x 13 "	21	8
10 x 12 "	22	8¼
10 x 14 "	23	8½
10 x 16 "	26	9

WEIGHT OF BLINDS.

Two sheets to each window of 12 lights.

7 x 9	11 lbs.	2 ft. 6 in. x 6 ft. 6 in.	23 lbs.
8 x 10	13	2 8 x 6 8	24
9 x 12	14	2 10 x 6 10	25
9 x 13	17	3 0 x 6 6	26
10 x 12	17	3 0 x 7 0	27
10 x 14	19	3 0 x 7 6	29
10 x 16	21	3 0 x 8 0	32
10 x 18	22	3 2 x 8 2	34
10 x 20	26	3 6 x 8 6	40

While the tables are not absolutely correct, as the weight of lumber varies, yet they are sufficiently near the truth to enable the estimator to obtain an idea as to the cost of freight when he knows the rate per 100 pounds. The table referring to glazed sashes will also give the estimator a fair idea of the cost of sash weights required for any given work. The following table may also be of service in estimating cost of freight on dressed and undressed lumber:

Pine boards or plank,	weight per M.	2,700 lbs.
Flooring, dressed,	"	1,900
Ceiling, " ⅜ in. thick,	"	800
" " ½ "	"	1,200
" " ⅝ "	"	1,400
" " ¾ "	"	1,600
Boards, surfaced one side,	"	2,000
Dimension stuff, rough,	"	2,700
Shingles, per ¼ M. bunch		40
Pickets or other dressed stuff, per 100 ft.		200

From these tables, the weight of all the lumber and dressed stuff in a building may be determined, and the cost of freights to any given point obtained, railroad or steamboat charges per 100 pounds being known.

Weighting Windows.

IN preparing weights for sashes, care should be taken that the lower sheet is nicely balanced. The usual custom of making the weights of the lower sheet a trifle less than weight of sash, is all wrong, inasmuch as the weight of cords and friction of axle act against the weights more than against the sash, therefore it is better to have weight and sash just about balance. If the top sheet contains the same size glass, and same number of panes, the weights used should be the same heft as used in the lower sheet. This will always have a tendency to keep the top sheet snug to the top of the frame, as the weights will be a little heavier than the sash, owing to the fact that the bottom rail of the lower sash is always made heavier than the top rail of the upper sheet, while the meeting rails are the same in both sheets. Close, but not too tight-fitting, of sashes, enables them to move freely in their grooves, though, when fitting, allowance must be made for three coats of paint on the sash and three coats on the frame. Generally the trouble with hung sashes is the paint; painters do not exercise the care they should when painting window sashes and frames. Sometimes a little soap applied to the groove in which the sash travels will perform wonders in assisting the sash to move easily.

MASTER PLUMBERS OF CANADA.

PROCEEDINGS OF THE THIRD ANNUAL CONVENTION OF THE NATIONAL ASSOCIATION AT QUEBEC.

CANADA'S ancient and historic city of Quebec has so much of interest to offer visitors that it has become the Mecca of travellers from all parts of the world. It was therefore wisely chosen as the meeting place of the third annual convention of the National Association of Master Plumbers of Canada.

The convention opened on June 29th, and closed on the evening of Dominion Day. The following delegates were in attendance: J. Burns, E. Lesperance, James Sadler, Thos. Forest, T. Christie, J. Brunet, P. J. Carroll, J. Watson, J. W. Harris, M. Montpetit and Jos. Lamarche, of Montreal; J. Higman, Ottawa; M. Crump and M. Day, Halifax; H. Hogarth, J. K. Allison, W. H. Meredith, Jos. Wright and W. Mansell, Toronto; J. Pennington, Windsor; C. E. Pickard, Quebec; Wm. Smith, London; Joseph Wright representing Vancouver, and Wm. Smith representing St. Thomas, as these places were unable to send delegates.

The Executive held a session in the morning, at which the various matters to be brought before the convention were considered.

The first business session of the convention opened at 3 p.m., Mr. Wright, the President, being in the chair.

Messrs. Higman, of Ottawa, Allison, of Toronto, and Lesperance, of Montreal, were appointed a Committee on Credentials.

The following gentlemen, representing manufacturing and supply firms, were in the city during the convention, and were admitted to the preliminary session: P. McMichael, of The James Robertson Co., Toronto and St. John, N.B.; W. Robinson and L. Payette, of Warden King & Son, Montreal; J. M. Taylor, of The Toronto Radiator Co., Toronto; E. Hebert, of H. R. Ives & Co., Montreal; H. McLaren & Co., Montreal; W. H. Wiggs, of Mechanics' Supply Co., Quebec: L. H. Gaudry, Quebec; Col. Massey and R. Lockhart, of The Gurney-Massey Co., Montreal; Geo. Moffat, of The Robert Mitchell Co., Montreal; Charles Robertson and A. A. Robertson, of The James Robertson Co., Limited, Montreal; Geo. H. Booth, of The Toronto Steel-Clad Bath Co., Toronto, and A. Saunders, of the Goderich Organ Co.

Communications were read from Mr. Wiggs, of The Mechanics' Supply Co., Quebec, and J. W. Hughes, of Montreal, regretting their inability to be present.

The President, after welcoming the representatives of the supply houses, handed the Secretary his annual report, which was read to the convention as follows:

PRESIDENT'S REPORT.

To the Delegates and Members of the National Association of Master Plumbers, Gas, Steam and Hot-Water Fitters of the Dominion of Canada.

GENTLEMEN, So swiftly do the months pass, it is difficult to realize that a year has elapsed since you did me the honor of placing me in the chair. It must be pleasant to you, as it is to me, to see again the familiar faces of your brethren in the craft.

Since the formation of our Association, two years ago, the day has passed when a master plumber, gas, steam or hot water fitter regarded his fellow craftsman as an enemy, for whom he had no use, and whom he hoped to assist to get off the earth. Education and experience have taught us, not only the uncharitableness and moral wrong of such a feeling, but also its utter inexpediency and futility from a business point of view. We have found, as have other industries, that cut-throat competition can only lead to mutual extermination or self-destruction. We now regard each other as men who must of necessity be coadjutors and co-workers for the mutual good and profit of the trade.

In our city, when we met together in local association, we speedily discovered two facts: that we did not know by sight even men whose names were household words in our business, and secondly, that these men, instead of being evil disposed adversaries, were mighty good fellows. Then let me welcome you all as good fellows to a convention of an honorable industry.

The importance of a convention like ours is not to be underestimated. We are acting, not for ourselves alone, but for all those engaged in our line of business, whether members or not, throughout the Dominion of Canada. Every one of these must be more or less affected by legislation of this assembly. Let us remember then the great diversity of conditions that prevail in a country as large as ours, the variety of local practice in a constituency so dispersed and varied. In matters where national practice is uniform we can adopt uniform and rigid rules, but in reference to local affairs there must be an elasticity of law that will permit local associations to make local rules not conflicting with the National Association and By-Laws.

Our relations with manufacturers and dealers in general during the latter part of last year were not very satisfactory. Complaints have come to the Executive Committee from St. John, N. B., that T. McAvity & Sons and Thos. Robertson & Co., Limited, of Montreal, and others, were violating the resolutions signed by them.

Your Executive Committee took the charges up and wrote these firms, and they denied the charges, and it was thought best for your President to visit Montreal and investigate. I was able to meet at the Windsor Hotel Messrs. McAvity, of St. John, T. Doody, Provincial Vice-President for St. John, N.B., and P. J. Carroll, Provincial Vice-President for Quebec, and I am pleased to report that we were able to adjust all charges satisfactorily to all. I also made an appointment to meet Mr. Robertson, of Thos. Robertson & Co., Limited, of Montreal, and P. J. Carroll, Provincial Vice-President. We met again at the Windsor Hotel, Montreal, and were able to adjust matters satisfactorily.

I have also met the manufacturers and dealers of Toronto. One of the points discussed was the interpretation of the term Master Plumber, Gas, Steam and Hot Water Fitter, as set forth in our regulations. My interpretation differs from those given by some members of the local association in London, Montreal and Toronto. This should come before this convention and be settled.

I am pleased to report that we have local associations from the Atlantic to the Pacific Ocean. I was at Vancouver and organized a local association there on the 27th May. I am sorry I was not so fortunate in Victoria, B.C., as the trade there were out for a good time, keeping the Queen's birthday for three days, all the time I was there. Vancouver, B.C., will try and get the plumbers to form a local there.

I visited Winnipeg on the 31st May, and met the officers of the local association and dealers at the Manitoba Hotel. We were able to adjust all their grievances satisfactorily.

During the year I have made five visits to Montreal, two to Ottawa, one to London and Hamilton, on business connected with the Association.

At Hamilton I regret I was not able to get a meeting of the plumbers.

The Executive Committee met in February last in Montreal. The meetings have been a great help to our Association, manufacturers and dealers. A printed report of these meetings has been sent to all members. In closing, I extend my sincere thanks to the officers of the Association, to the members of the Executive Committee, and to you, the members of the Association, for the unfailing courteous treatment and assistance which I have received from you at all times, at the same time trusting you will kindly forgive any shortcomings in my administration.

The future of the Association is in your hands. I ask you to give your best thought to the deliberations of this convention, and your best efforts and enthusiasm to the promotion of our common interest throughout the coming year.

On motion of Mr. Allison, seconded by Mr. Lesperance, the report of the President was received.

The report of the Executive Committee was next presented, as follows:

REPORT OF EXECUTIVE COMMITTEE.

Your committee have pleasure in submitting their annual report to the third annual convention for the year ending June 30th, 1898.

Three meetings of the Executive have been held as a whole during the year, the first meeting being held on the blue waters of Lake Ontario on our National Day, 1st of July, 1897. The second meeting was held in the Royal City of Montreal on the 2nd day of February, 1898, and the third meeting was held in the city of Quebec on the 29th of June.

At the first meeting, on July 1st last, the main business transacted was the appointment of a sub-Executive Committee, whose duty it was to consider all grievances submitted to them for adjustment and decision. The President, Mr. Joseph Wright, Mr. J. B. Fitzsimmons and W. Mansell, Secretary, were elected a sub-committee, with full executive power. Several matters of more or less serious import were brought before this sub-committee during their first six months in office, at their several meetings held for that purpose, all of which were handled with care and consideration. At the beginning of the present year, a circular was issued by Vice-President Carroll and his colleagues of the Executive throughout the Dominion, asking their opinions as to the advisability of holding a full Executive meeting in the city of Montreal about the 1st of February, and as the replies were all in favor of same, a summons was issued calling the meeting together on the 2nd of February.

At the several meetings held on that date and the day following, very important business was transacted, some of the fruits of which are already being reaped. Joint meetings were held by our Executive and representatives appointed by the manufacturers and jobbers, when many misunderstandings were corrected and the best of good fellowship prevailed; no decision was arrived at till the conclusions were satisfactory to all present.

It is very gratifying to be able to record in this report, that the advice of our Executive at that meeting, to the manufacturers and jobbers present with us then, has been adopted by them, and they have formed their different associations into a Dominion body. It is also very gratifying to report that the hopes of our last year's Executive have been assured by the zealous action of our President, who, in the interests of this Association, went as far as the Pacific Coast, and by organizing an Association of Master Plumbers, Gas, Steam and Hot Water Fitters in the city

of Vancouver, B.C., forged the connecting link that makes our Association complete from the Atlantic to the Pacific oceans. While not extending our Association as fast as we anticipated, it is very encouraging to be able to report that steady progress is being made, which is well known to be the surest way of attaining solid and lasting construction. While expressing our hearty appreciation of the achievements of our President, there is necessity of having some Executive officer specially appointed for the purpose of organizing every master plumber and fitter in the whole Dominion under the banner of our Association. Although we can look back with pride on the results of the labors of our predecessors, much more remains to be done before we can rest on our oars and feel satisfied to hand over the reins of control to our successors with that feeling of contentment that our labors in the past have not been wasted, and that we can relinquish our active effort with that feeling of satisfaction that they have not put forth for selfish or harsh purposes, but for the improvement of our Association, and for the trade protection of the interests of all master plumbers and fitters throughout the Dominion.

We regret to have to say that some of our larger cities and towns still remain unorganized, but with the proper person entrusted with this work, we can freely say that there need not be a city, town or village unrepresented at our next convention, and we strongly urge that special consideration be given to the subject of organization this session.

JOS. WRIGHT, President.
W. MANSELL, Secretary.

On motion of Mr. Denman, seconded by Mr. Pennington, the report was received.

Mr. William Smith, Dominion Vice-President, then presented his report, as follows:

VICE-PRESIDENT'S REPORT.

GENTLEMEN, One year ago you honored me by placing me in the position of Vice-President of the National Association, of which I am thankful and justly proud, and the time has now come for me to give an account of what I have done during my term of office. In all matters of importance I have consulted with the Executive Committee before acting, and in all cases I have found them prompt and painstaking and conservative in their advice, and as a member of your Executive I might state that your Executive acted upon a number of important matters during the year, which I leave to be dealt with in the committee's report. During the year I have had occasion many times to explain to the wholesale trade the full meaning of the resolutions, and in each case my explanation was satifactorily received. I might also inform you that through the efforts of your Sanitary Committee of last year and the Association of this year, we have been successful in getting the Board of Health of the city of London to pass a Plumbing By-Law. I now call your special attention to the great evil that is caused by local associations forming themselves into what I call a combine to get better prices for their material and work. In our London Association it was formed against my wishes, and it resulted in nearly wiping out our Association, and from what I can learn it has ruined the St. Thomas Association. I am satisfied that the time has now arrived when we should stand together to get all that we are legally entitled to, and I hope the day is not far distant when we will enroll all the good-thinking plumbers of the Dominion under our banner. I am sorry to say that the increase of membership for the past year in the west has been very small, but the outlook for the coming year is encouraging. I now take pleasure in thanking the officers and members for the kindness shown me during my term of office, and in closing it is my earnest hope that the coming year will dawn brighter for the plumbing and heating fraternity.

WILLIAM SMITH, Dominion Vice-President.

On motion of Mr. Carroll, seconded by Mr. Day, the report was received.

Mr. T. J. Carroll, Vice-President for Quebec, presented his report for the year as follows:

REPORT OF VICE-PRESIDENT FOR QUEBEC.

GENTLEMEN, A year ago I was honored by being chosen your Vice-President for the province of Quebec, and I respectfully beg to lay before you my report for the past year.

My relations with the master plumbers in my jurisdiction have been most cordial, and I desire first of all to return to them my sincere thanks for the aid they rendered me in the discharge of my (in some instances) unpleasant duties; to the Executive officers of the National Association I also owe much gratitude for their many kindnesses rendered me during the past year.

We had many occasions for anxiety during the past year for the future of our Association, owing principally to the open disregard of the solemn promises made to us by the wholesale trade, and to the unfortunate and demoralizing indifference of the members of our trade. As to the differences between the Master Plumbers and the supply houses, it is gratifying that they have been very satisfactorily arranged by the meeting between us held on February 2nd in Montreal. As to the indifference of our members, how much has been said on the subject and how little good has been effected. Would that we could instil into the minds of our members the benefit to ourselves and to the public at large that would arise from constant and devoted interest in the affairs of our Association.

I have endeavored during my term of office to enthuse the members of our trade into more active support of our local associations, both by conversations and much correspondence, and while the measure of success has not been as great as I wished, I trust that the few results so far will have lasting effects, and that during the coming year the efforts put forth by your officers will bear fruit an hundred fold. As to the members of the craft in our province who have not yet joined our ranks, I can assure you that it is not because the members of the local association have not by all means endeavored to have them join us; however "there are none so blind as those who won't see."

In the city of Montreal, it is indeed gratifying to the trade to see the City Council taking a new and very active interest in the heretofore sadly neglected Plumbing By-Laws. There now seems to be in the City Council aldermen who recognize the importance of a proper supervision and inspection of the plumbing of dwellings, shops, etc., and we have reason to hope that in the near future, owing to representations made by the Master Plumbers, we will have a Plumbing By-Law second to none on the continent.

We have often been reminded at former conventions of the absolute necessity of secrecy as to our actions at meetings. I cannot do more than recommend it at once. Let us be true to ourselves, and we will compel others to be just to us.

We should communicate one with the other as frequently as possible, because it creates a friendly feeling between us, and by the exchange of ideas we become more proficient in the discharge of the duties we owe to the public as Master Plumbers. Also the Executive officers should be prompt in replying to communications, so that our members will feel that their interests are being attended to.

In conclusion, I trust that you will pardon me for the many suggestions I have made, instead of giving you a complete resume of the work accomplished by us during the past year, but in my opinion it is better that the work we have accomplished should be given in detail by word of mouth rather than in writing, particularly when the work done is pretty well known to all present.

The whole respectfully submitted.

P. J. CARROLL, Vice-President, Quebec.

On motion of Mr. Higman, seconded by Mr. Allison, the report was received.

Mr. John Barton, Vice-President, representing Nova Scotia, presented the following report of the work in Nova Scotia and Prince Edward Island:

NOVA SCOTIA AND PRINCE EDWARD ISLAND.

It is with great pleasure that I now make my second annual report as vice-president of this association, representing Nova Scotia, which includes Prince Edward Island, and to state that all matters pertaining to the benefit of the craft in our section of the Dominion are satisfactory. Our trade relations still continue amicable with the wholesale houses, and are carried out satisfactorily to both plumbers and themselves. Any difference arising at any time is settled at once by myself and our local associations. As you are aware that the arrangements made with us and the trades, manufacturers and supply houses, and which is signed by the majority of manufacturers and dealers from Halifax to Toronto, is such that they cannot sell to any but association members. This has been the rule since our local organization, before the national association was formed, and still works satisfactory to all parties, and, in my opinion, should be adopted by the national association.

I am only one in the matter, but the day will come when this association of master plumbers of the Dominion of Canada will find that steps will have to be taken in this respect if we want to live.

Our membership is about the same as last year, the majority of whom are in good standing, but I must again mention that we have Nova Scotia plumbers on the list of New Brunswick. This should be changed, and those plumbers and members of New Brunswick association who live and do business in Nova Scotia should be transferred to our association. This requires the co-operation of our brother plumbers in New Brunswick, who, I have no doubt, will be only too willing to meet us in this matter.

I am sorry to state that we have not yet been able to get the western master plumbers with us (by this I mean western Nova Scotia), but have hopes that if our national association can co-operate with our brother associates in the United States, that this can be arranged satisfactorily. As long as the western plumbers can buy in the United States market, they will not be with us.

Speaking of our trade relations with our confreres in the United States, I can only reiterate what I stated in my report last year, namely, that this National Association of Master Plumbers should take some action whereby we could co-operate and have better trade relations with the association of the United States, both for our own protection as well as all the local associations of the Dominion.

On behalf of our association I would ask that some action be taken in the matter at the forthcoming convention.

In conclusion, gentlemen, I must express my regret at not being able to attend the convention, but hope in the near future to be able to be with you as in the past.

Respectfully submitted,

JOHN BARTON,
Vice-President representing Nova Scotia.

On motion of Mr. Forest, seconded by Mr. Lesperance, the report was received.

The report of the Sanitary Committee was next presented as follows:

REPORT OF SANITARY COMMITTEE.

Your committee have pleasure in reporting that during the past year considerable progress has been made in the most necessary of all sanitary work, viz: the general education of the public. The pulpit, the press, the school, the platform, and last, but not least, the master plumber, and the master Plumber's associations, have all contributed their share, and slowly but surely the general public are awakening to the fact that it pays to be healthy. Once this view of the question becomes the general belief of the masses, there will be no difficulty in making, and what is of more importance, in the carrying out of sanitary laws and by-laws. But there is still an immense amount of missionary work to be done before the masses and the classes can be got to believe that most cases of illness are caused by the violation of nature's laws, which are God's laws, for He made them, and that any infraction of them will be followed by a sure punishment.

If our people drink sewage polluted water, they will have to bear the pains and penalties, as well as the expenses incidental to an outbreak of typhoid fever. If they inhabit filthy dwellings, breathe a polluted atmosphere, and live in the midst of unsanitary surroundings, they will be subject to the penalty of having some filthy disease. Man can no more take into his system the germs of disease and expect to escape the penalty, than he can swallow arsenic or laudanum and escape the effects of these drugs. If instead of looking upon an outbreak of illness as a mysterious dispensation of Providence inflicted upon us for our sins in general, we would understand that the sin of violation of God's sanitary laws was visited by the punishment made and provided, there would be more attention given to the state of the drains, the source of the water and milk supplies, and our legislators would not hesitate to pass, and what is more important, enforce, laws calling for good plumbing, pure water, effective drainage, light and ventilation in our dwellings in proportion to the needs of the occupants.

Your committee would recommend our association to point out to our legislators the necessity already great in our large and growing cities, for the careful supervision of tenement houses and the dwellings of the poor. Already there is overcrowding; dark rooms are becoming common; absence of sunlight and ventilation is producing the usual results, and if our large towns wish to avoid the sad and costly experience of other countries the question must be taken up at once. Plumbing bylaws and general sanitary regulations are needed for the protection of the masses and especially for the poor who are unable to protect themselves.

The rich employ the best talent and use all precautions against the admission of disease-producing elements into their homes. The poor man, alas! is compelled by his poverty to live under such conditions as his purse will allow.

The state has a duty in this matter, that of protecting those who cannot protect themselves in sanitary matters, and your committee would strongly urge upon our legislators in the Dominion parliament the passing of a law for the Dominion, covering these important questions—a law laying down the general sanitary principles and preventing the use of improper materials or the employment of wrong methods, whether in the city, town, village or the isolated dwelling.

The public press has recently given an account of a terrible state of affairs in connection with a certain public work. Accounts of the outbreak of diptheria and kindred diseases in lumber camps, and similar places are not infrequent, and the little hamlets and villages are frequently visited by death-dealing scourges that would have no existence were even the most elementary sanitary laws known and practiced by the inhabitants.

Men are employed by the government to educate our people in such questions as the manufacture of cheese and butter or the rotation of crops; surely the health of our inhabitants, the most important asset we have, is of equal importance.

Millions have been spent in inducing the foreigner to come to our country; surely a few thousands could be spared to protect and prolong the lives of our much more valuable population.

As long as the death rate in any district remains above normal, it proves that valuable lives are being wasted, the saving of which would at least be of equal value to the country, with the introduction of foreign emigrants to take the place of those needlessly sacrificed.

In the special line in which we are interested progress has been made. The call for the better class of fixtures is becoming more frequent, better materials are being used, and slowly but surely the public is being awakened to the fact that good plumbing pays, that the best is none too good, and is in the end the cheapest, and that every man who can caulk or solder a joint is not entitled to be called a plumber.

Rigid examination and certification of plumbers will, we hope, soon be the rule, and the inspector of plumbing be considered as necessary to the completion of the roll of municipal officers as the mayor or city surveyor.

To secure these things we must work shoulder to shoulder—not crushing a weak brother, but rather lending him a helping hand, for on the uplifting of our calling and the proper appreciation of it in a great measure depends the health of large numbers in our cities and towns.

Respectfully submitted,

J. W. HUGHES, Secretary,
JOHN WATSON,
J. W. HARRIS,
Sanitary Committee.

On motion of Mr. Sampson, seconded by Mr. Forest, the report was filed and the secretary instructed to furnish extracts to the press.

The following report of the Essay Committee was read:

REPORT OF ESSAY COMMITTEE.

In view of the present condition of association matters in our district, your committee take this opportunity of making a few remarks.

Our committee is of a more diversified nature than in any other city in the Dominion, and, consequently, the aims, interests and opinions of those who are looked to to form and maintain a local association make it difficult for them to amalgamate on the same lines, and the action that is deemed necessary and right by one part is apt to be looked upon by the others with a certain amount of distrust, and as an effort to curtail their chances in doing business. While, at the same time, some of those who are in a position to know and do better fail to act up to the principles which are taught in the association, and, instead of seeking steadfastly to maintain the benefits that the association seeks to secure for the trade at large, take advantage of those benefits and then personally sacrifice them by giving them over, with sometimes a little more, to secure work which they would often be better without. These combined causes make it a difficult task to show to the trade at large that there is any value to be received for the money they are called upon to contribute for the association expenses.

It is a singular problem to explain how a man with more than the average amount of brains necessary to conduct both the commercial and mechanical business of plumbing, who has spent all the working hours of his lifetime to learn the mechanical part, and all that ought to be his leisure in mastering the commercial part, can deliberately sit down with a price list, a discount sheet and an architect's specification and make out some of the tenders which were put in for work during the past few years.

Whether it is greed for work or ignorance, the result is most disastrous, both to themselves and the rest of the trade, and sometimes to their creditors. We venture to say that there is not a man in the business today who does not hope that when the time comes that he has to lay down his kit and hand in his time sheet his business will be continued by a son, a son-in-law or other heir, and think what a white elephant a business is, part of which is conducted on these lines. Whether it is possible for association teaching or experience to improve this condition is a problem that must engage the attention of the thinking men in all trades, but especially in ours.

Trusting that these few remarks may bear some fruit is the wish of your committee.

C. E. PICKARD. A. FOREST.
R. SAMPSON. J. B. LANE.
O. MATTE.

On motion the report as read was adopted.

The announcement was made that reports from Ottawa, St. John, Winnipeg, Fredericton and Stratford had not come to hand. Some of them were said to be in the mails.

Mr. Day intimated that there were 27 members in good standing in Halifax.

On motion of Mr. Smith, seconded by Mr. Allison, the reports of the secretary and treasurer, although not entirely complete, owing to the illness of the treasurer, were received and Messrs. Allison, Watson and Crump were appointed an auditing committee. This committee reported having found the treasurer's books correct. They referred back the secretary's report for further consideration, until such time as complete returns should be received from the various associations.

A communication was read from the wholesale dealers extending greetings and tendering an invitation to the convention to partake of their hospitality at the Chateau Frontenac.

On motion by Mr. Meredith, seconded by Mr. Lesperance, the invitation was accepted.

A telegram was also received from the Master Plumbers' Association of the United States, extending greetings.

A communication was read from the local association at Vancouver, B. C., requesting Mr. Wright, the president, to act as the representative of that association.

Lieut. Col. Massey briefly addressed the convention expressing his pleasure at witnessing the friendly relations between the plumbers and supply firms.

A communication was read from the wholesale dealers with reference to resolutions passed recently by the executive committee. The letter was as follows:

JOSEPH WRIGHT, ESQ., President Master Plumbers' Association.

DEAR SIR,—Regarding the within resolution, the members of the executive committee of the Dominion Heating and Plumbing Supply Association, at present in Quebec, having met together and discussed the same, beg to suggest to the Plumbers' Association that the proper channel to refer this resolution to would be the secretary of the Dominion Heating and Plumbing Supply Association for their official consideration at their next meeting.

J. M. TAYLOR.
F. MASSEY.
W. H. WIGGS.

On motion of Mr. Smith, seconded by Mr. Mansell, it was resolved that a telegram be sent to the chairman of committees from whom reports had not been received, instructing them to continue in their position until discharged by the association.

On motion of Mr. Mansell, seconded by Mr. Pennington, Messrs. Matte, Pennington, Denman, Allison and Day were appointed a standing Committee on Resolutions.

On motion of Mr. Carroll, seconded by Mr. Smith, Messrs. Watson and Burns were appointed substitutes for Mr. Harris and Mr. Montpetit.

The meeting adjourned until eight o'clock.

EVENING SESSION.

The convention reassembled at 8:30 p.m., Vice-President Smith in the chair.

The Committee on Resolutions reported as follows:

REPORT OF COMMITTEE ON RESOLUTIONS.

(1) From Mr. Barton, Halifax. The committee appointed to report on the resolutions, do first recommend that the executive use their influence to get the New Brunswick members doing business in Nova Scotia transferred to the Halifax local association; that they also use their influence with the master plumbers of western Nova Scotia to persuade them to join the Halifax association.

(2) Regarding vice-president's report, your committee desires to express its approval of Mr. Smith's suggestion regarding combines; we think them detrimental to the welfare of our association.

(3) Regarding Mr. Carroll's report, committee recommend that Mr. Carroll's suggestion with respect to secrecy of the business carried on by the local associations be concurred in.

(4) We are sorry to hear that the local association of Quebec has not worked satisfactorily for the last year. Recommend that the members of this association do try to get them to unite according to the Quebec committee's report.

(5) We take much pleasure in the good work done by the executive officers and hope that every member of this association will continue to assist them in every way possible, as only by united action can we succeed.

(6) We recommend that the report of the sanitary committee be received and adopted, and also that a copy of the same be given to the press for publication.

O. MATTE. GEO. C. DENMAN.
M. DAY. JOS. PENNINGTON.
K. J. ALLISON.

It was decided that the report of the Legislative Committee should be read clause by clause.

On motion of Mr. Pennington, seconded by Mr. Forest, the secretary was instructed to secure names of firms not connected with the association, with the object of inducing them to join.

On motion of Mr. Mansell, seconded by Mr. Forest, it was decided that letters be sent to the various associations relating to contract work.

In connection with clause 3 of the report last presented, the necessity of greater secrecy in connection with the business of the association was emphasized.

Mr. Burns moved a resolution, which he afterwards withdrew, requiring that an extra binding oath be taken by the members of the association.

Instead of this course it was decided to instruct the secretary to send out a strong letter to members recommending absolute secrecy.

Messrs. Wright, Carroll and Matte were appointed a committee to visit the local plumbers of the city and tender to them an invitation to attend a special meeting for their benefit, with the object of improving local conditions.

The convention then adjourned.

After adjournment the members spent a very pleasant evening at the Chateau Frontenac, as the guests of the supply firms.

SECOND DAY.

The morning session opened at 8:30, Vice-President Smith occupying the chair.

After some discussion, it was resolved, on motion of Mr. Harris, seconded by Mr. Watson, that Messrs. Carroll, Harris and Higman be appointed a committee to look into the matter of trade relations with the manufacturers of soil pipe, and report. In this connection, it was announced that a meeting of soil pipe manufacturers would take place on July 12th, and it was suggested that a committee should confer with them on that occasion.

On motion of Mr. Carroll, seconded by Mr. Sadler, a vote of thanks was tendered to Mr. Briggs, the Treasurer, who, through illness, was unable to attend the convention.

The Chairman suggested the appointment of a committee to consider

MR. WM. SMITH,
President National Association of Master Plumbers.

the relations of the Association to the wholesale hosues. He also made reference to the matter of a discount sheet, and urged the necessity of local associations remitting their per capita tax within a specified time.

The practice of members of the Association taking copies of specifications to wholesale supply firms was condemned.

On motion of Mr. Pennington, seconded by Mr. Higman, Messrs. Pennington, Higman and Harris were appointed a committee to consult with the jobbers and manufactuers with regard to matters in relation to which improvement is desirable.

After consideration, this committee presented the following report :

QUEBEC, June 30, 1898

This committee ask the wholesale dealers and manufacturers not to meddle in any way or shape with the plumbers' business, viz.: Not to give prices on plans and specifications supplied them, either by contractors or plumbers; also, not to give prices to proprietors, or give them any information in connection with plumbers' business, or inform any plumbing firm that such and such a job is going on.

JAMES PENNINGTON,
JOHN HIGMAN,
J. W. HARRIS.

REPORT OF APPRENTICE COMMITTEE.

Your committee appointed to consider the subject of "The Apprentice," beg to report that, apprenticeship as it relates to the term apprentice in its strict interpretation a person bound to serve for a number of years, and receiving in return for such services, instructions in his master's business, does not exist in this country in relation to the plumbing trade.

Apprenticeship had its origin in the system of associated trades, which prevailed in almost all parts of Europe during the middle ages, and without close association of the trade, it cannot be effective, for reasons expressed in the report of the last apprenticeship committee for the year 1897.

In the precarious state of the plumbing trade, when viewed throughout the entire country, it is a very serious matter for a young man to contemplate binding himself to serve for a number of years, with an almost certain prospect of finding himself, like Othello, without an occupation at the expiration of his apprenticeship.

There are but few cities in this country where an apprentice could be sure of obtaining correct instruction, and in none of the towns. Probably fifteen places in Canada would be the outside number where proper conditions exist for the education of an apprentice. A correct handling and use of the tools will no longer suffice. A plumber of to-day must be technically, mentally and practically up-to-date.

An apprenticeship of seven years, as of old, will only fit him to commence a life-long study of new appliances and the application of the latest regulations.

Under present regulations, owing to the imperfect working of Boards of Health, in respect to our trade, and the enormous waste of energy necessary to the bringing about of improvement, it is useless to expect the average town of 5,000 people to present the latest information along

MR. J. W. HARRIS,
Vice-President National Association of Master Plumbers.

the line of applied mechanics in relation to sanitary plumbing, to say nothing of the heating of buildings, by wind, vapor and water, as well as to solve the problems of the tinners' trade.

It is to the cities then we must turn to find correct conditions and instructions during apprenticeship for the plumbers of the future.

The trade is each year changing in respect to the duty of a plumber. Now a journeyman has little to do but erect appliances, previously designed, made and practically ready for operation at the factory, and in this respect the trade of plumbing is becoming more and more an exact science, and one man without a helper can easily accomplish many times the work formerly done. For this reason fewer helpers or apprentices are used than formerly, and, without wishing to venture as prophets, we believe that before many years have elapsed, the journeymen plumbers will be divided into two classes, repairers and erectors, and

MR. W. H. MEREDITH,
Treasurer National Association of Master Plumbers.

that the new additions to the trade will come from the technical colleges and trade schools.

W. H. HEARD, Chairman.

On motion of Mr. Pennington, seconded by Mr. Mansell, the report of the Committee on Resolutions was received and the committee discharged.

Mr. Carroll presented the report of the committee appointed to consider the soil pipe question. The report was received and adopted, and it was ordered that a copy of the same be sent to the manufacturers.

Some discussion took place as to the advisability of appointing permanently a paid Secretary.

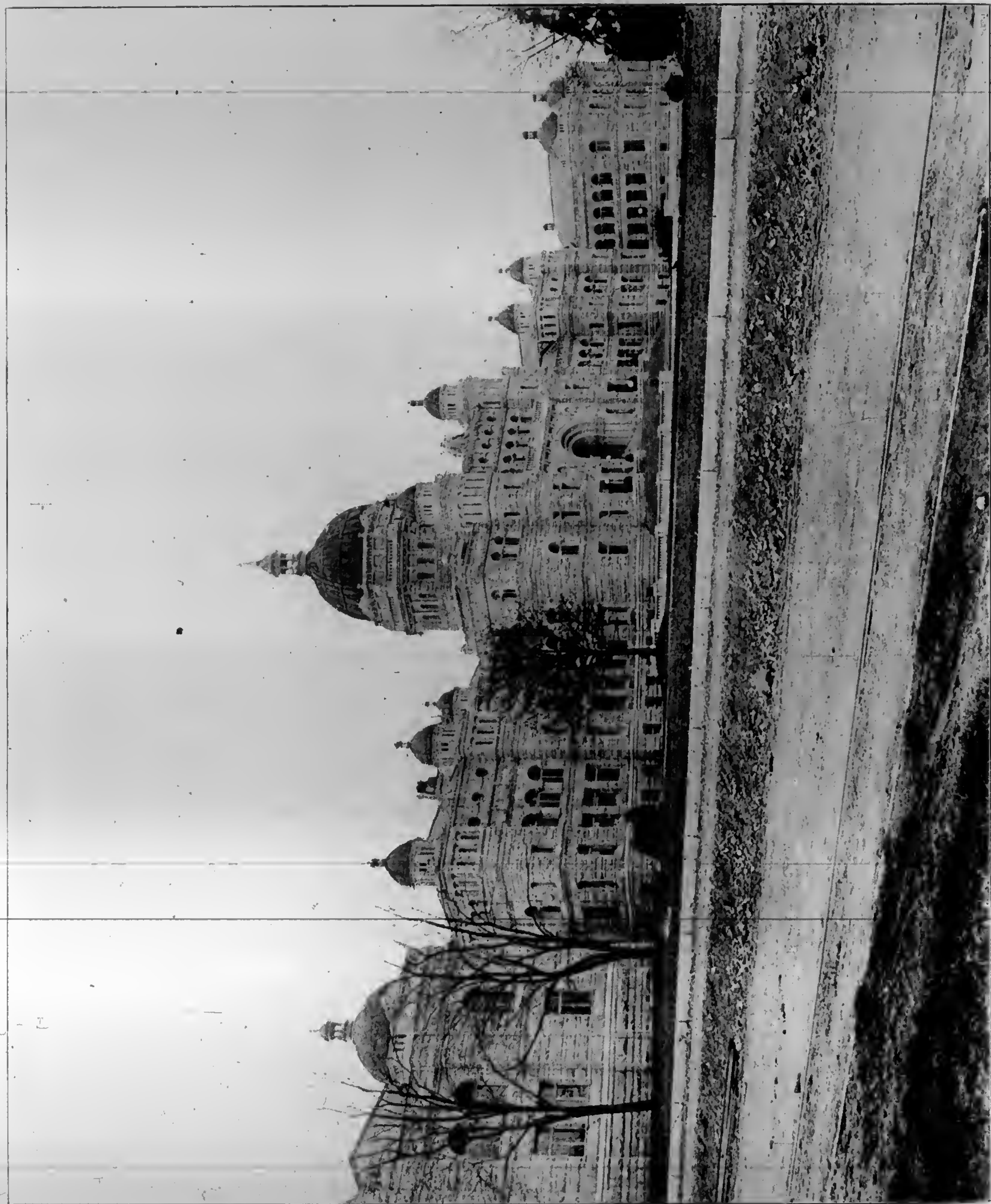
On motion of Mr. Mansell, seconded by Mr. Pennington, it was resolved that a committee be appointed to consider the matter.

It was resolved, on motion of Mr. Carroll, seconded by Mr. Harris, that a certificate of membership be issued to members in good standing,

NEW LEGISLATIVE BUILDINGS, VICTORIA, B.C.

Entrance, with Iron Gateway; Showing Group of Members of Present Legislature.

F. M. RATTENBURY, ARCHITECT

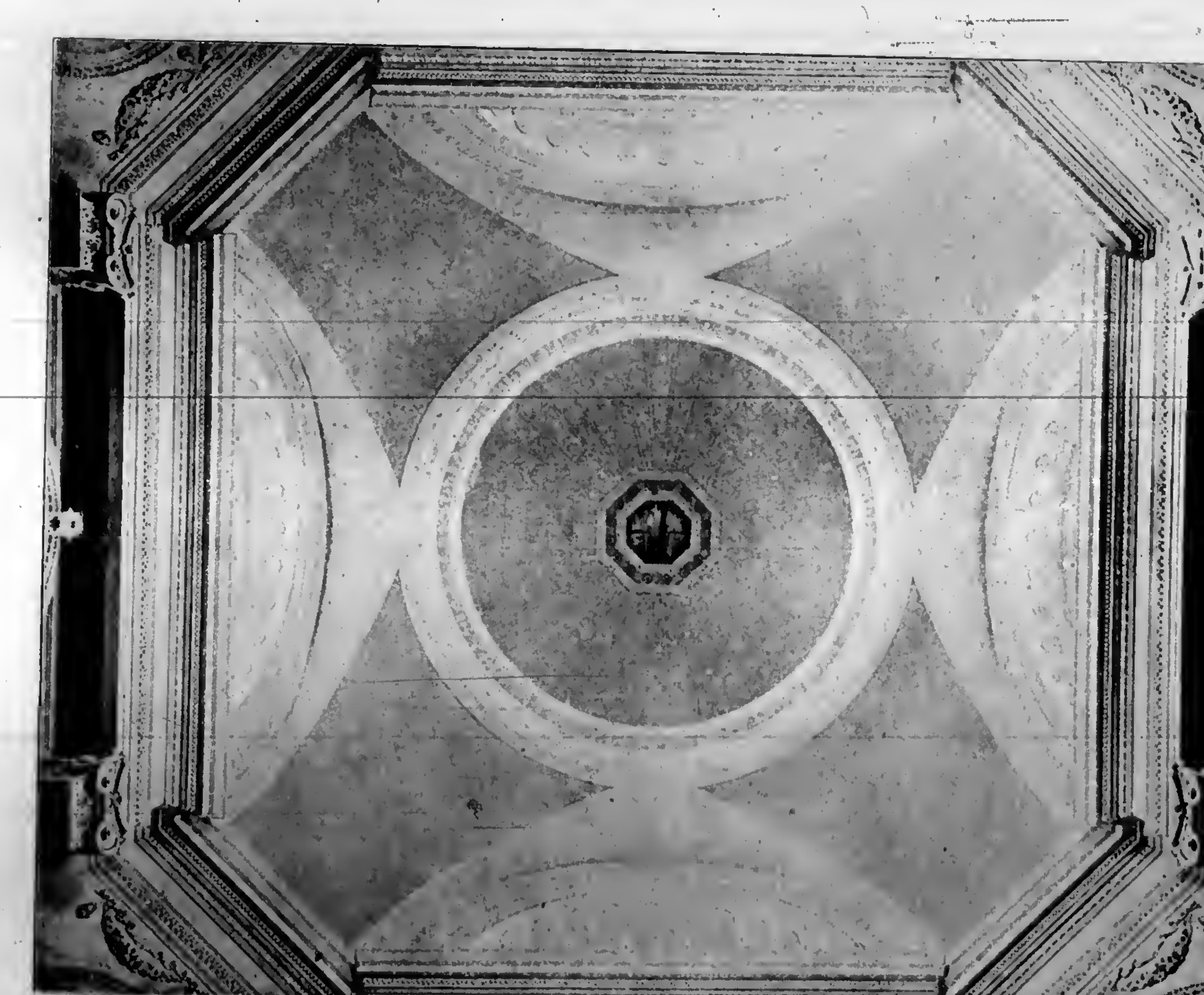


NEW LEGISLATIVE BUILDINGS, VICTORIA, B.C.—FRONT ELEVATION.

F. M. RATTENBURY, ARCHITECT.

New Legislative Buildings, Victoria, B.C.—Main Corridor, First Floor, Showing Section of Stairway.
F. M. Rattenbury, Architect.

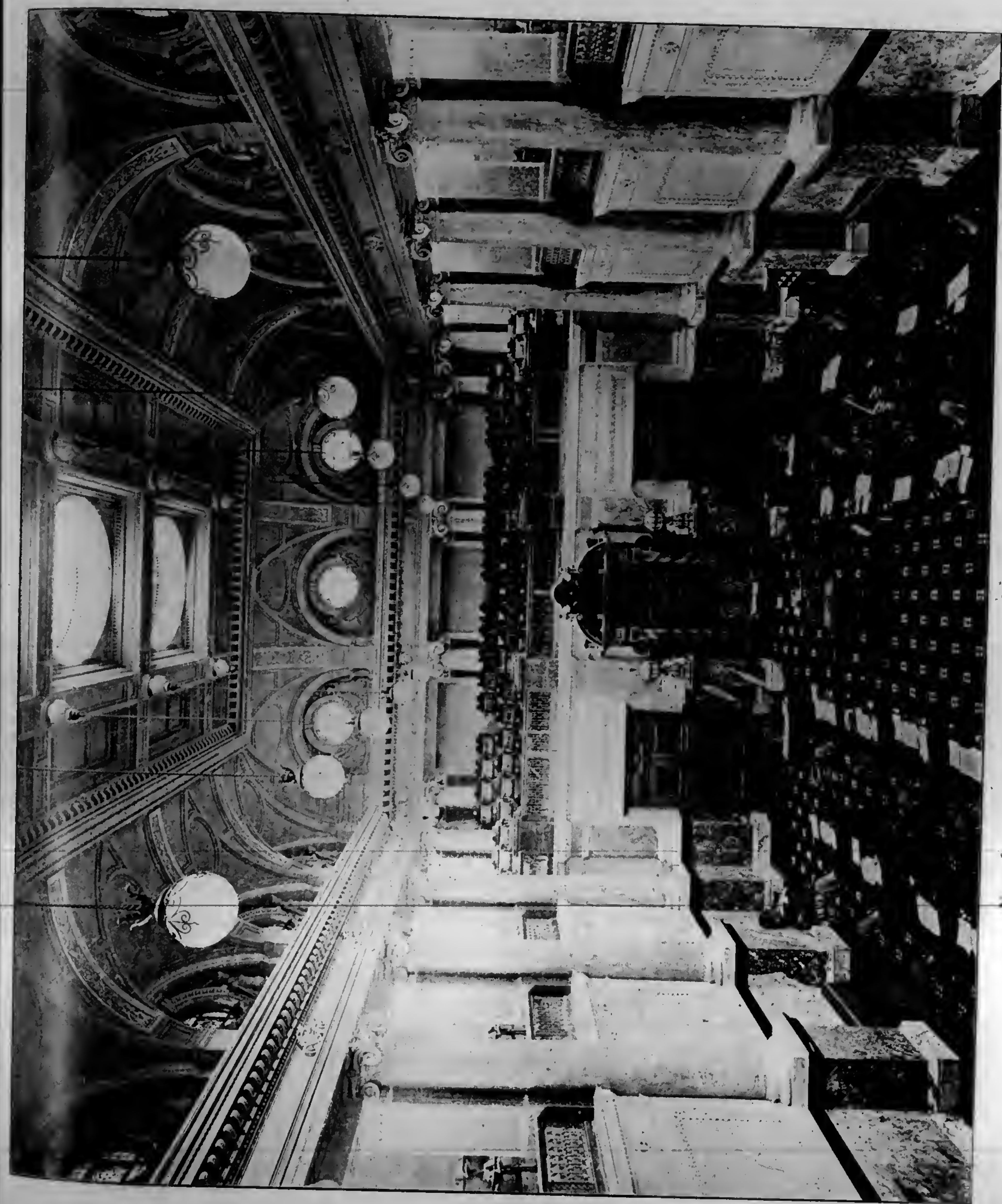
Rotunda Leading to Legislative Hall



Ceiling of Dome.

New Legislative Buildings, Victoria, B.C.
F. M. Rattenbury, Architect.

New Legislative Buildings, Victoria, B.C.—Main Entrance, showing Grand Stairway and Architectural Details.
F. M. Rattenbury, Architect.



New Legislative Buildings, Victoria, B.C.—Legislative Hall.
F. M. Rattenbury, Architect.

CANADIAN ARCHITECT AND BUILDER.

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—THE—

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(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD WEDNESDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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Errata. WE regret that a mistake should have occurred in the letter press description in our last number of the new Legislative Buildings at Victoria, B. C. The statue at the left of the main entrance is that of Sir James Douglas, first governor of British Columbia, not of Capt. George Vancouver, as stated. Capt. Vancouver is honored by a statue surmounting the dome.

Experts Disagree. THE advantage or otherwise of using coke breeze or ashes in concrete is at present receiving attention in the British journals. A decided difference of opinion appears to prevail. One so-called authority, Mr. T. Blashill, architect, recommends "coke breeze and cement concrete, mixed four parts to one," as a material for "pugging," which stands fire and water better than anything else. Mr. H. B. Lang, another expert, protests against the use of breeze or ashes for such purposes, on the ground that such a material retains the heat longer than any other known, and thus causes the iron or steel girders to expand and twist.

Faulty Construction. SEVERAL accidents of a serious nature, due to faulty construction of buildings, have taken place in Canada during the present year, yet no serious attempt seems to have been made to fix the responsibility or punish those to whose ignorance or neglect the disasters were due. In Great Britain they appear to do things differently. A large building known as the Westminster Mansions, in London, recently collapsed while under construction, killing seven persons. The Coroner's Jury found that the killing of these persons was due to culpable negligence of the architect in permitting a pier to be designed and constructed in a faulty manner, a secondary cause being careless mixing and inferior quality of the concrete. The London Daily News, in commenting on the case, remarks that "parts of the building, and those of the greatest structural importance, appear to have been put up by sheer rule of thumb. Established rules as to the proportions between the height and the breadth of the supports were wholly disregarded." The finding of the jury is tantamount to a verdict of

manslaughter against the architect, Mr. Pawley. Added to the verdict is the recommendation that a greater control should be instituted in the construction of buildings. The need of a proper standard of qualification for architects and the enforcement of wise and stringent building by-laws is every year becoming more apparent.

Swivel Windows.

A BUILDING ordinance was recently passed by the City Council of Chicago, compelling the use of swivel windows above the second story of all new buildings. The purpose of the law is declared to be the prevention of the numerous accidents attending the cleaning of stationary windows. The new law provides that upper story windows must swing on horizontal or vertical pivots, otherwise a balcony must be built in front of every window. Opposition has arisen to the law on the ground that it was designed to benefit the owners of patents on swivel windows, and also that the size of windows will have to be reduced owing to wind pressure, and accidents will result from falling window sash.

Rights of Trade Unions.

LORD Herschell, P.C., G.C.B., who is at present in Canada in the capacity of head of the British Commission to adjust the differences between the United States and the Dominion, when Lord High Chancellor of England, gave a celebrated decision in December last regarding the legal rights of trades unions. The case was that of Allen vs. Flood, in which it was held that Allen, as secretary of a trade union, violated the law by procuring the dismissal of Flood and another workman by threatening that their retention would be followed by a general strike of their fellow workmen. Lord Herschell, in rendering judgment, said he could not doubt that it would have been perfectly lawful for all the workmen to leave their employment. As against this view, we have the recent decision of Justice Bischoff, of the New York Supreme Court, preventing by injunction the officers of the Plumbers' and Gas Fitters' Benevolent and Protective Society from interfering with the workman of an employer who refused to join the association.

The Fallacy of Cheapness.

THE first cost of an article, whether for building purposes, or for furniture, is not the only thing the purchaser should consider. A house properly and substantially built, finished from cellar to attic in first-class style, and fitted with the best plumbing, ventilating, lighting and heating apparatus, must cost at first much more than a flimsy, cheaply built and cheaply fitted house of same dimensions. But the result is, the more costly house holds its own, while the cheap house settles, the plastering cracks and falls off, the timber shrinks and pulls everything with it, the roof leaks, a smell of coal gas permeates the whole building, the water pipes give continual trouble, while the furnace is a perpetual annoyance. Doors won't close, locks and bolts are always out of order, and the carpenter, plasterer, painter and plumber are always in request, while the yearly bills for repairs are actually appalling. The well built house requires no repairs for years after the workmen leave the finished contract; it looks well at first, and keeps up its appearance to the end. It is cool in summer, warm in winter, and its atmosphere is always clear and healthful, while its inmates are cheerful and happy. It may have cost several hundreds of dollars more than the cheap house at first, but the owner of the latter will have paid in five years, for repairs, doctor's bills, and irritable inconveniences and discomforts, much more than the difference in cost.

New York Building Code.

THE effort which is being made in New York to have a new building code prepared for the enlarged city is in the hands of a widely representative committee, consisting of delegates from the New York Chapter of the American Institute of Architects, the New York Board of Fire Underwriters, the New York Board of Trade and Transportation, the Mason Builders' Association, the Association of Master Plumbers, the Architectural Iron Manufacturers, the Builders' League, Mechanics' and Traders' Exchange, Building Trades' Club, Real Estate Exchange, the Real Estate Owners and Builders' Association, the North Side Board of Trade, West End Association, Upper East Side Association and the New York Fire Department. Three delegates from each of these bodies form a committee, which has been holding meetings for several months, and it may therefore be presumed are not only urging the Municipal Assembly to prepare a new building code, but are ready with a draft of suitable provisions.

Proposed Modern Hotel for Toronto.

THE announcement is made that at last the project for the erection in Toronto of a large modern hotel, has taken definite form. The Walker property on King street east, with additional land immediately to the east of same, is said to have been purchased at a cost of nearly half a million dollars as a site for the building. A survey of the site has been made by Messrs. Harding & Gooch, of New York, who will immediately proceed with the preparation of the plans. The building will have two frontages, on King and Colborne streets, with, it is said, an arcade connecting these thoroughfares. It will be made as nearly fire proof as possible, and will embody every modern requirement. The cost is placed at $750,000. We reiterate our belief that the enterprise, if properly managed, should undoubtedly prove a financial success and greatly add to the prosperity of the city, while some heavy and it is to be hoped profitable contracts should fall to the lot of our contractors for work and materials.

The British Workmens' Compensation Act.

THIS act, the purpose and provisions of which were recently outlined in these columns, went into operation on the first of July. It embodies an entirely new principle in law, by declaring that in future the undivided responsibility for accidents to workmen, arising from whatever cause, must be borne by the employers. From our point of view this is manifestly unjust. The employer's only means of security is to insure the lives of his workmen against accident, and in so doing to add another heavy charge to the constantly increasing expense of doing business, in the face of growing competition and decreasing profits. The greviousness of the situation is accentuated by the fact that the rates quoted by the insurance companies are six times greater than Mr. Chamberlain, the promoter of the bill, estimated they would be. This fact further serves to indicate the serious estimate entertained by the actuaries of the responsibility which the employers have

been compelled to assume. It is recognized that the present insurance rates are experimental and subject to revision as the results of the law shall become known. Many difficulties appear to stand in the way of the operation of the act, and expensive litigation will probably be necessary for its interpretation. Arbitration proceedings under the act are also likely to involve considerable costs.

National Plumbers' Association of Canada.

A PERUSAL of the various reports presented at the recent plumbers' convention at Quebec, printed in our July issue, serves to show that those entrusted with the management of the Association are making an earnest effort to elevate the standard of the plumbing business. The difficulties in the way of maintaining in successful operation local associations in the various provinces in affiliation with a central organization representing the entire Dominion are well nigh insurmountable in a country of such vast extent and having but a very limited population. Such a movement can only succeed as the result of great personal effort and much sacrifice of time and money on the part of the few who have the cause deeply at heart. It augurs well for the success of the plumbers' movement that the management of the central organization has been placed in the hands of men of this class. It is to be hoped that as the Association and its objects become better known, the advantages proceeding from it will be more generally recognized and appreciated by the trade, when many present discouragements may be expected to disappear. The appointment of a permanent secretary and organizer was a step in the right direction, but in view of the amount of publicity which it is possible for the Association to obtain in the columns of legitimate trade journals which regularly circulate throughout the trade, the necessity of an official bulletin is not strikingly apparent. The attention bestowed on its publication might with greater profit be given to what may be termed the more legitimate departments of association work.

Strength of Materials.

OUR readers will no doubt be interested in the results of tests of white pine, stone and bricks recently conducted by Prof. W. A. Pike at the University of Minnesota. Sticks of thoroughly seasoned white pine were tested for tensile strength. They were dressed to a uniform scantling 12 in. in length with shoulders on ends to take the pull. In scantling they varied from 3/4 in. square to 1 3/8 in. by 2 1/2 in.; average specific gravity 0.66. The average ultimate tensile strength was 7,373 lbs. per square inch. It was observed that the longitudinal shearing strength of the ends of the sticks, in resisting the pull, was less than has been generally given. The ends had a shearing area of 45 sq. in., but it was necessary to spike and clamp the ends in order to prevent splitting. Thirty-five tests were made of white pine wood for resistance to compression, in which the pieces varied from 1 in. cubes to pieces 3 in. square and 54 in. in length. Of those which broke by direct compression, the crushing resistance averaged 5,283 lbs. per square inch; 1 in. cubes bore 7,800 lbs. Pieces 3 in. square and 54 in. long bore 5,222 lbs. per square in.; 24 in. long, 5,038 lbs.; and 12 in. long, 5,505 lbs. per square inch. Of those which failed by a combination of crushing and bending from 54 in. to 24 in. long and from 4 in. by 2 in. to 1 in. in return, the average actual stress of load was about 3,000 lbs. Half bricks placed between pieces of pasteboard were tested for crushing resistance. St. Louis bricks failed flatwise under 6,417 lbs. per square inch; edgewise, under 4,080 lbs.; Hastings red brick, hard, medium and soft failed respectively under 2,017, 2,012, and 1,748 lbs. per square inch.

Art Commissions.

BROOKLINE, which is a suburb of Boston, recently established an art commission, before whom all designs for public buildings, parks, roadways, and other public works of importance were to be submitted for approval. A month or two ago the public school board selected a design for a new school, and the same was submitted to the art commission, which, after a thorough inspection, refused to approve of the design. This raised the ire of the school board, who gave it out that if the design submitted by the board was not approved, no school would be built; and, as more school accommodation was imperative, the citizens succumbed, and straigtway repealed the law and abolished the commission, with the result that the objectionable school buildings will be erected, and will perpetuate the ignorance of the school board and the stupidity of the citizens. The incident, however, may result in good, as a movement is on foot to have an act passed through the legislature of the state making it compulsory on municipalities to appoint art commissions, to whom all designs of public buildings, monuments, bridges, &c., must be submitted for approval. This will take out of the hands of local boards or municipalities the power to make such a "bluff" as the Brookline board made, and will be in the interest of the state at large. If some such law was in force in Ontario, our cities and towns would not be "dotted" over with so many architectural monstrosities. It costs the country no more to build "things of beauty" than to build an ornamental nondescript. A little art knowledge combined with a modicum of brains, mixed with bricks and mortar, would often relieve us of much chagrin and disappointment.

EXTERNAL COLOR DECORATION.

WHAT beautiful external decoration, says Painting and Decorating, is made by the five figures of Giovanni Della Robbia, in Pistoria, namely, Faith, Hope, Charity, Prudence and Justice; also by the immortal frieze, called "The Seven Works of Mercy," of which beautiful copies can be seen at South Kensington Museum, and which are good in any case as an inspiration in that class of external decoration. Not less important or beautiful are the medallions of the arms of the King of Anjou, and the months of the year, both by Luca, and also found among the many treasures of the same museum.

It would be too long to enumerate the many examples of decoration in majolica by the Della Robbia's family, who began with Michael, born about 1320, followed by Luca, about 1399, by Andrea, in 1435, and by Girolamo in 1488. Afterwards one branch of this family became almost French, and finished with Guido Della Robbia, who did not reach the age of touching the clay, but died in 1625 at the age of only five years.

Another system of external decoration not less beautiful and well adapted to resist atmospheric changes is without doubt that of graffito, which was adopted with immense technical artistic knowledge in the renaissance of the Italian art.

SCHEDULE OF CHARGES OF THE R. I. B. A.

THE following revised code of professional practice and schedule of charges has recently been sanctioned by the Royal Institute of British Architects :—

1. The usual remuneration for an architect's services, except as hereinafter mentioned, is a commission of 5 per cent. on the total cost of works executed under his directions. Such total cost is to be valued as though executed by a builder with new materials. This commission is for the necessary preliminary conferences and sketches, approximate estimate when required (such, for instance, as may be obtained by cubing out the contents), the necessary general and detailed drawings and specifications, one set of tracings, duplicate specifications, general superintendence of works, and examining and passing the accounts, exclusive of measuring and making out extras and omissions.

2. This commission does not include the payment for services rendered in connection with negotiations relating to the site or premises, or in supplying drawings to ground or other landlords, or in surveying the site or premises and taking levels, making surveys and plans of buildings to be altered, making arrangements in respect of party walls and rights of light, or for drawings for and correspondence with local and other authorities, or for services consequent on the failure of builders to carry out the works, or for services in connection with litigation or arbitration, or in the measurement and valuation of extras and omissions. For such services additional charges proportionate to the trouble involved and time spent are made. The clerk of the works should be appointed by the architect, his salary being paid by the client.

3. In all works of less cost than £1,000, and in works requiring designs for furniture and fittings of buildings, or for their decoration with painting, mosaics, sculpture, stained glass, or other like works, and in cases of alterations and additions to buildings, 5 per cent. is not remunerative, and the architect's charge is regulated by special circumstances and conditions.

4. When several distinct buildings, being repetitions of one design, are erected at the same time from a single specification and one set of drawings, and under one contract, the usual commission is charged on the cost of one such building, and a modified arrangement made in respect of the others ; but this arrangement does not apply to the reduplication of parts in one building undertaking, in which case the full commission is charged on the total cost.

5. If the architect should have drawn out the approved design, with plans, elevations, sections and specifications, the charge is 2½ per cent. upon the estimated cost. If he should have procured tenders in accordance with the instruction of his employer, the charge is ½ per cent. in addition. 2½ per cent. is charged upon any works originally included in the contract or tender, but subsequently omitted in execution. These charges are exclusive of the charge for taking out quantities. Preliminary sketches and interviews, where the drawings are not further proceeded with, are charged for according to the trouble involved and time expended.

6. Should the client, having approved the design, and after the contract drawings have been prepared, require material alterations to be made, whether before or after the contract has been entered into, an extra charge is made in proportion to the time occupied in such alterations.

7. The architect is entitled during the progress of the works to payment by instalments on account at the rate of 5 per cent. on the amount of the certificates when granted, or alternatively, on the signing of the contract, to half the commission on the amount thereof, and the remainder by instalments during their progress.

8. The charge per day depends upon an architect's professional position, the minimum charge being three guineas.

9. The charge for taking a plan of an estate, laying it out, and arranging for building upon it, is regulated by the time, skill and trouble involved.

10. For setting out an estate, the position of the proposed road or roads, taking levels, and preparing drawings for roads and sewers, applying for the sanction of local authorities, and supplying all necessary tracings for this purpose, the charge is 2 per cent. on the estimated cost. For subsequently preparing working drawings and specifications of roads and sewers, obtaining tenders, supplying one copy of drawings and specification to the contractor, superintending works, examining and passing accounts (exclusive of measuring and valuing extras and omissions), the charge is 4 per cent. on the cost of the works executed, in addition to the 2 per cent. previously mentioned.

11. For letting the several plots in ordinary cases, the charge is a sum not exceeding a whole year's ground rent, but in respect of plots of great value a special arrangement must be made.

12. For approving plans submitted by the lessee, and for inspecting the buildings during their progress, so far as may be necessary to ensure the conditions being fulfilled, and certifying for lease, the charge is a percentage not exceeding 1¼ per cent. up to £5,000, and above that by special arrangement.

13. For valuing freehold, copyhold, or leasehold property, the charge is :—

On £1,000	1	per cent.	
Thence to £10,000	½	"	
Above £10,000	¼	"	on residue.

In valuations for mortgage, if an advance is not made, one-third of the above scale. The minimum fee is three guineas.

14. For valuing and negotiating the settlement of claims under the Lands Clauses Consolidation Act or other Acts for the compulsory acquisition of property, the charge is on Ryde's scale as follows :—

ON AMOUNT OF SETTLEMENT, WHETHER BY VERDICT, AWARD, OR OTHERWISE.

Amount. £	Gs.	Amount. £	Gs.	Amount. £	Gs.	Amount. £	Gs.
100	5	2,200	24	5,200	39	8,200	54
200	7	2,400	25	5,400	40	8,400	55
300	9	2,600	26	5,600	41	8,600	56
400	11	2,800	27	5,800	42	8,800	57
500	13	3,000	28	6,000	43	9,000	58
600	14	3,200	29	6,200	44	9,200	59
700	15	3,400	30	6,400	45	9,400	60
800	16	3,600	31	6,600	46	9,600	61
900	17	3,800	32	6,800	47	9,800	62
1,000	18	4,000	33	7,000	48	10,000	63
1,200	19	4,200	34	7,200	49	11,000	68
1,400	20	4,400	35	7,400	50	12,000	73
1,600	21	4,600	36	7,600	51	14,000	83
1,800	22	4,800	37	7,800	52	16,000	93
2,000	23	5,000	38	8,000	53	18,000	103
						20,000	113

Beyond this half a guinea per cent.

The above scale is exclusive of attendances on juries or umpires, or at arbitrations, and also of expenses and preparation of plans.

15. For estimating dilapidations and furnishing or checking a schedule of same, the charge is 5 per cent. on the estimate, but in no case less than two guineas. For services in connection with settlement of claim by arbitration or otherwise, extra charges are made, under Clause 8.

16. For inspecting, reporting and advising on the sanitary condition of premises, the charge must depend on the nature and extent of the services rendered.

17. In all cases travelling and other out-of-pocket expenses are paid by the client in addition to the fees. If the work is at such a distance as to lead to an exceptional expenditure of time in travelling, an additional charge may be made under Clause 8.

18. When an architect takes out and supplies to builders quantities on which to form estimates for executing his designs, he should do so with the concurrence of his client, and it is desirable that the architect should be paid by him rather than by the builder, the cost of such quantities not being included in the commission of 5 per cent.

Among the colors upon which lime has no bad effect, and which may therefore be employed with safety for water-colored ceilings, walls, etc., are siennas and umbers, Vandyke brown, ivory black, Naples yellow, French ultramarine and Chinese vermilion.

Experiments have been made in England to ascertain the action of concrete on lead pipe buried in it, with the following result, as reported by a contemporary. If the matrix of the concrete is lime, and the concrete is in a damp position, the lime will reduce the metal to ceruse or carbonate of lead, or a crude white lead. If Portland cement instead of lime concrete is used, the lead will be oxidized, or reduced to a hard, brittle, dirty-red looking material. Examples of such deterioration are frequently found at the junctions of lead soil-pipes, as used in England, with stoneware drains, and where pipes pass through walls below the damp course. Lead pipe may be protected by laying it through stoneware drain-pipes embedded in the concrete ; but in such cases the ends of the pipe should be open, in order to prevent the accumulation therein of carbonic acid gas, which would act injuriously upon the lead. Pitch and asphalt are both good materials for protecting lead pipes that are exposed to corrosive influences. But drain-pipes afford the best protection, as the lead pipe can then be withdrawn for repairs.

BY THE WAY.

A QUEBEC paper has an account of the narrow escape of an architect of that city from drowning. While attempting to escape from the pranks of acquaintances on the wharf, the architect is said to have precipitated himself and a lady companion into the water by overturning the boat. The names of the principals in the adventure are not given.

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IN designing porches a young architect of my acquaintance has recently introduced a feature which is regarded with favor. The usual railing between the supporting posts at the corners is omitted, and the floor between these posts carried out two or three feet, the sills being extended to support it. The swinging of hammocks between the supporting posts of the porch or verandah is thus rendered possible, and the comfort of the occupants of the house during warm weather thereby greatly enhanced.

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THERE is said to be a large granite quarry about fifty miles from St. Johns, Newfoundland, where granite has been hewn, by some convulsion of nature, into rectangular blocks of different sizes, so conveniently assorted that schooner loads of selected stones have been brought to St. Johns, and used in some of the public buildings and warehouses, with little or no hand-dressing by masons. The new post-office and custom house, built after the great fire which practically wiped out all the business part of the town, are, says Stone, partly constructed of these granite blocks hewn by nature.

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INDIAN Engineering relates how the authorities of a certain eastern state imported an expensive road roller, without having taken the precaution to see that the weight of the machine was proportioned to the strength of the highway bridges over which it would be required to pass. The working weight of the roller proved to 15 tons, and it turned out, says our contemporary, to be a veritable "Invecta," for its unsuitability for the numerous bridges and culverts intersecting the main roads, was soon discovered in a manner better imagined than described. The sad alternative is to either take the roller to pieces at every bridge or culvert, or to dismantle the latter and rebuild them to suit the former.

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WHEN the builders on the island of Crete are in want of stone, they go to the peasants, who excavate half a meter below the level and help themselves to ready-made material from the walls of the ancient cities. The peasants find the sale of this second-hand material more profitable than the cultivation of the land. The stones are sold to those who are building houses in the villages near the ancient city and also exported to the other villages of the Massara plain and to the neighboring provinces. The Turkish government, so zealous in preventing the work of explorers who come to carry on scientific work or excavations, pays no attention whatever to the work of destruction daily going on under its eyes. In fact, when it has public constructions to erect, it goes so far as to procure its material by the very same system, thus often tearing down important monuments, which disappear without leaving a trace of their former existence.

ILLUSTRATIONS.

STORE AT BERLIN, ONT.—W. A. LANGTON, ARCHITECT.

RESIDENCE FOR MR. CAMERON, FORT WILLIAM, ONT. SIMPSON & ELLIS, ARCHITECTS.

The building is frame on a stone foundation, the outside being clapboarded and the interior finished in quartered oak. It is designed in the Colonial style.

CLUB HOUSE OF THE TRITON FISH AND GAME CLUB, LAC A LA CROIX, QUE.—HARRY STAVELEY, ARCHITECT.

The club house, which is situated on the shores of Lac a la Croix, about one hundred miles from Quebec, is built of wood, clapboarded, the gables in rough cast, using large pebbles taken from the beach some of them quite bright in color. The building contains 30 bedrooms, besides club lounging room, dining room; photo room, writing room, guides' dining room, etc., etc. Cost about $7,000.

DRILL HALL, QUE.—E. E. TACHE, ARCHITECT.

The Quebec drill hall, erected on Grande Allee, presents thereon a facade of 345 feet in extent, the main building measuring 265 feet and the two pavilions flanking the same 40 feet. It is designed in the early French Renaissance style, constructed in front of Beauport rock face masonry ; the plinth base of Terrebone cut stone ; the cornices, moulded string courses, door and window dressings, etc., of Dechambault cut stone ; the back and side exterior walls and inside divisions of Canadian brick.

The drill hall itself measures inside 260 by 90 feet. A continuous gallery supported by wrought iron brackets extends around the whole room. Staircases in the turrets and on each side of the rear entrance give access to this gallery, which also communicates with the second flat of each of the pavilions.

The armories, which occupy the rear and sides of the building, open on the main hall.

This edifice was erected by the Department of Public Works, Ottawa, from plans prepared by E. E. Tache, Assistant Commissioner of Crown Lands, P.Q., under his supervision and that of W. J. Peters, Clerk of Works, and was built by Costelow & Lortie, contractors.

The original contract price thereof was $62,000, and its actual cost $66,722, of which $15,000 was defrayed by the local government and $15,000 by the city corporation—the building being also designed to accommodate provincial exhibitions when necessary. The operations of construction began in 1884 and were closed in 1887.

The complete project comprises also an outer castellated wall, extending from the pavilions 80 feet on each side, returning back 235 feet, and in the rear having a total front development of 505 feet. The space thus enclosed is intended to serve as parade grounds, and contains (resting back on the outer walls) open sheds for field guns, artillery trains, etc., and intended as well for exhibiting purposes. This part of the project has not yet been realized.

The Prince of Wales has approved of Mr. Lutyens to design the English pavilion for the coming Paris exhibition. The pavilion is to be in the style of an old English manor house. One wing of the building will be particularly ornate in furniture and fittings, for the prince has signified his intention of residing there while in Paris.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

HER MAJESTY'S THEATRE.

The new playhouse on Guy street, which is to be known as Her Majesty's Theatre, is being roofed in, and will be completed early in the autumn. The building was designed by Messrs. J. B. McElfatrick & Son, the well-known theatre architects of New York. The dimensions are 170 feet square, with a seating capacity of 2,000. The building, which is in the Italian Renaissance style, is constructed with limestone foundation and pressed brick superstructure. Precautions against fire have been made to accord with the requirements of the New York fire department, which are said to be the most stringent in the world. The contractors are Messrs. Peter Lyall & Sons, and the sub-contractors: Thomas Ford, carpentry work; William Rodden, iron work; G. W. Reed & Co., roofing; John McLean, plain and ornamental plastering; J. W. Hughes, steam heating, gas fitting and plumbing; W. Anderson, Ottawa, electric wiring.

FIRE PROTECTION FOR HOSPITALS AND CONVENTS.

The Montreal Gazette, referring to the recent hospital disaster at St. Hyacinthe, sounds this note of warning, which the authorities of such institutions would do well to heed:—"The unfortunate affair at St. Hyacinthe, like that which caused so sad a sensation when the Roberval convent was burned, carries a lesson for the managers of all institutions where considerable numbers of persons live and sleep. This province (Quebec) has an unusual number of these, many of them unprovided with means of suppressing a fire, and almost all of them, outside of the cities especially, without means of escape, in case of imminent danger, save the ordinary staircase and the windows." It should be stated that fire escapes are not the best means of protecting life in institutions occupied by invalids and women. The proper means to this end is to make the buildings themselves as nearly as possible fireproof. The materials and methods for so doing are now available, and the cost has been so greatly reduced of late as to constitute no serious obstacle. This is a matter that might with advantage occupy the attention of the Province of Quebec Association of Architects.

FAULTY CONSTRUCTION.

Mr. Lacroix, City Building Inspector, recently took proceedings against Mr. Louis Riopelle for non-compliance with the requirements of the building by-law in connection with the construction of a building on Nobert street. The Court appointed Messrs. Hutchison, Nelson and Lapierre, architects, to examine the building and report upon the character of its construction. They reported the construction to be defective and contrary to the requirements of the by-law, whereupon Mr. Riopelle was fined $25 and costs and notified to demolish his building within twenty-four hours. This order not having been complied with, the Building Inspector, with a staff of workmen, proceeded to the building for the purpose of tearing it down. They found it barricaded and the owner inside. One of the Inspector's men who attempted to scale the barricade was struck with a scantling, whether accidentally, as Mr. Riopelle alleges, or otherwise, does not yet appear. Riopelle was arrested on a charge of assault, being afterwards liberated on bail. The Building Inspector is determined to carry out the order of the court by demolishing the building. It is understood that the changes in construction required by the Inspector, and which Mr. Riopelle refused or neglected to make, were: To renew south-east foundation, which is considered dangerous; to replace pillars supporting different storeys by stronger ones; to replace joists, which are too short and of insufficient support, in accordance with Sec. 59-61 of Reg. 107; to take away stone divisions and replace with brick; to lower the front 25 feet, beginning at the north-west side; to build at back of house a masonry wall to shut off entirely a house in rear, which it supports—in accordance with Sec. 12-14, Reg. 107.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

ROOFING.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—My attention has been drawn to an article on this vexed question in your June number. My experience of fifty years in practical building, as builder, architect and owner, has been dearly bought. I certainly agree with the writer as to the merits of a gravel roof. I never could understand why some other means were not taken to keep the pitch in place; certainly the gravel has never attained that end. The weight added to building runs from 1,000 to 2,600 pounds per square. The roof is perfectly filthy after it has been on two or three years. About a month ago I was asked to inspect roofs on a manufactory not forty miles from Toronto, and found as much as 4½ inches of gravel and dirt on part of the building. The roof had sagged from four to five inches, and water stood on roof the year round, or filtered into the building.

I do not think the writer's remarks in the article referred to fit the present requirements, the conditions having entirely changed in twenty years in Toronto as regards metal roofs of all kinds. At that time, gases, acids, etc., from coal and manufactories of different kinds had not to be reckoned with, which entirely changes the situation. One case occurs to me now where one iron and three tin roofs were eaten off in four years. This building is now covered with a composition roof (a patent in its fourth year) for sixteen months, and is as good as new. Although nails, washers and wire are used in this roof, they do not come to the surface, consequently are not affected by the acids. This roofing complete only weighs 150 pounds to the square, and can be used at from half an inch to the foot up to four inches rise. This is a decided advantage over gravel, as the gravel roof is generally specified at half an inch rise. Returning to iron and tin roofing, I know of one steep tin roof that has been on fifty years, but never painted and never subject to gas or acids. I do not think a coat of paint once in seven years is any good to the roof. Once in two years might be a benefit, but what of the cost? As to adding 25 years to the life of a tin roof by painting once in seven years, I consider that altogether out of the question, owing to the change of conditions before mentioned, as the rust takes hold inside of a week. Oil or lead paints are about useless for roof-painting. I am using a composition having japan as the fluid, and find it will last as long as four coats of paint, which is a sure protection from acid. About five years ago, I was asked by a brother contractor and inspector to get up a first-class composite roof. A year later I summed up my experience, which went back to 1848—when coating magazines for the British government—by adopting asphalt to neutralize the pitch, and then wool to confine the two, strengthened with embedded wire, fastened with nails and tin washers coated with japan, mica, soapstone and sand—producing a light non-conductor, water, fire, acid, and, I think, lightning proof, and which will not crack. The patentee will keep full control until it has been tested for five years, before selling any rights to use it. I think Mr. W. A. Langton, architect, of your city, is the only person in Toronto having it in use, and that on a business block in an adjacent town.

DANIEL ALLEN.

GALT, ONT., July, 1898.

Mr. Fred. Langley, of Toronto, who is engaged in the study of architecture in New York, is at present home on vacation.

Mr. F. M. Rattenbury, architect, of Victoria, B.C., accompanied by his wife, recently made the trip from Dyea to Bennett in twenty-six hours.

The capstone of the tower of the new municipal buildings at Toronto was laid by the Mayor a few days ago. The tower, which is 240 feet high, will be surmounted by a spire 45 feet in height. It rests on a concrete foundation 72 feet square, the superincumbent weight being about 14,000 tons. The architect states that there has been no settlement of the structure.

NEW MANITOBA LIEN ACT.

FOLLOWING is a brief summary of the provisions of the new Mechanics' Lien Act passed at the last session of the Manitoba Legislature, and which went into operation on the 1st of June last:—

Any person, unless he signs an agreement to the contrary, who performs any work upon, or furnishes any materials for the erection or repair of any building, etc., shall have a lien for the price of such work or materials on such building, etc. No lien can be had for a less sum than $20. A lien, upon registration, shall arise and take effect upon the commencement of the work or service, or from the placing of the materials, as against instruments registered or unregistered. The lien shall attach the estate or interests of the owner. Mortgages against property existing at time of commencement of work or placing materials upon the ground, have priorty over a lien to the extent of the actual value of the land at time of commencement of improvements. Insurance money upon property upon which a lien exists is liable to application in reduction of lien after the satisfaction of mortgage placed upon the property before the commencement of the improvements. The owner is not liable for a greater sum than payable by the owner to the contractor. Where lien is claimed by any person other than the contractor, the amount is limited to the amount owing to the contractor or sub-contractor or other person. Persons liable on a contract for the payment of money shall, where the amount is $15,000 or under, retain 20 per cent. of the amount of the contract price for a period of thirty days after the completion or abandonment of the work. Where the amount is over $15,000, 15 per cent. shall be retained. All payments up to 80 per cent., or 85 per cent., where the contract price exceeds $15,000, made in good faith, and before notice of any lien to be considered good, and operates as a discharge to the owner. Payments of the percentages retained by owner may be made to discharge liens after thirty days from the time of the completion or abandonment of the work. Payments made by owner or contractor to persons performing work or furnishing materials, without notice of lien and in good faith, are considered good. This does not apply, however, to the percentage moneys, which must be retained by the owner. Liens, after notice of registration, have priority over all judgments, etc. Mechanics and laborers, whose lien is for wages, have, to the extent of thirty days' wages, priority over all other liens, as against the percentages retained by the owner. All other liens rank equally, there being no priority by virtue of prior notice or registration. Where a contractor makes default in the performance of contract, the percentages shall not, as against a wage earner claiming a lien, be applied on account of damages, etc. Every device to defeat a lien is null and void. "Wages" embraces all moneys earned by a mechanic or laborer for work done, whether by the day or piece work. During the continuance of a lien, no portion of the material affected shall be removed so as to prejudice the lien. When material is actually brought upon the ground to be used in connection with any building, it shall be subject to a lien in favor of the person supplying same until put into the building.

Liens are to be registered in the land titles offices. A claim for a lien shall state: Name and residence of persons claiming lien; name of owner of property to be charged; person for whom work has been done or materials furnished; time within which work has been done, and a short description thereof; the amount claimed; the description of the land to be charged, etc. (Schedule of form is contained in act.) A lien may include claims against any number of properties, and a number of persons may unite in one lien. Claims are not invalidated by informality. Liens registered are an incumbrance against the land. A lien of a contractor or sub-contractor, to be effective, must be registered during the performance of the contract, or within thirty days after the completion thereof. A lien for materials may be registered before or during the furnishing thereof, or within thirty days after the furnishing or placing; a lien for services at any time during the performance of the service, or within thirty days thereafter. A lien for wages at any time during the performance of the work, or within thirty days after the last day engaged. Liens not registered within times above stated to cease to exist. Liens registered to cease to exist if proceedings be not taken within ninety days after the work or service has been completed or materials furnished. Upon death of lien-holder, his right shall pass to his representatives. A lien may be discharged by a receipt signed by the claimant or his agent duly authorized. Money may be paid into court for security of lien. Court may vacate the registration of lien on any ground. Taking of promissory notes or other security by the claimant does not destroy right to lien. Lien-holders are entitled to know terms of contract from owner. Court may on summary application order production of contract for purpose of inspection. Any number of lien-holders may join in one action.

Actions to enforce a lien shall be tried before a judge of the court of Queen's bench at regular sittings, or, when the aggregate amount of the liens do not exceed $1,000, by a local judge of the court in whose district the cause of action arose. Local judge has all the powers of a local master under the Queen's bench act; may determine the issues involved or refer same to a judge of the court of Queen's bench. Persons who have not, at the time of trial, proved their claims, may be let in to do so upon certain conditions, (proceedings are laid down as to mode of trying issues resulting from the registration of liens). Any decision on a lien by a judge is subject to appeal where the amount involved is over $100. The plaintiff's cost in an action to substantiate a lien shall not exceed in the aggregate 25 per cent. of the amount of the lien. The same provision applies in case costs are awarded against plaintiffs. Ordinary judgment may be given where a person fails to establish a lien. The act not to apply to liens existing prior to the passing of the act. The former lien act (chapter 97 revised statutes and chapters 28 of 58 and 59 Vic. and 14 of 59 Vic.) is repealed.

USEFUL HINTS.

Boiling hard putty in a little water to which has been added a small quantity of raw oil will cause the putty to absorb the oil while hot. After pouring off the oil, the putty may be easily worked into good condition.

Fine bolted whiting is a good thing to add to graining color for oak when it is desired to thicken it without changing the shade. Melted bees' wax, or soap dissolved in hot water, and added to the color while warm, may also be used.

The maximum economy of metal in a plate girder exists, says J. A. L. Waddell in Indian Engineering, when the weight of the flanges is equal to the weight of the web with its stiffening. As for the question of deflection, there is no need of figuring on it at all, because any depth of web that will involve the greatest economy of metal in the girder will provide ample stiffness.

HARDWOOD FILLER.—The following is found in Meyer Brothers' Druggist: Use boiled linseed oil and enough powdered starch to make a very thick paste—add a little japan and reduce to proper consistency with oil of turpentine. Add no color for white oak or white ash; for other wood add enough color to cover the white of the starch. For dark ash and chestnut use little raw sienna; for walnut, burnt umber and a very little Venetian red. Apply the filler with brush or rags, let dry for several days, then sandpaper.

Stucco is made by diluting very fine newly-baked plaster in a hot solution of white Flemish glue, so as to make a soft paste. Various coloring substances are added to the paste to imitate marble. These colors are the same as those employed for painting houses. When the mixture is dry it is polished with pumice stone and then with whetstone and tripoli. A final polish is given by rubbing it with a piece of felt and soapsuds and then with oil. With this imitation marble pillars, floorings and children's toy marbles are made.—Science Francaise.

For heat resisting putty, a handful of burnt lime is stirred in 120 grams of linseed oil and boiled down to the ordinary consistency of putty. The elastic mass is then allowed to dry in a thin layer in a place not reached by the rays of the sun. It becomes very hard. For use the putty is held over the fire or the cylinder of a lamp, and the cracks caused by heat or the cracked pieces are cemented with it. Over the lamp cylinder the putty becomes soft and very pliable, but after cooling it gets very hard and binds the different materials very firmly together.

The Germans are showing a predilection to paper floors, an important advantage in the use of which is said to consist in the absence of joints, whereby accumulations of dust, vermin and fungi dangerous to health are done away with. The new paper floors are bad conductors of heat and sound, and, in spite of their hardness, have a linoleum-like, soft feel to the foot. The cost is considerably lower than that of floors made of hardwood. The paper mass receives a small addition of cement as binder, and is shipped in bags in powder form. The mass is stirred into a stiff paste, spread out on the floor, pressed down by means of rollers and painted with oakwood, nutwood or mahogany color, after drying.

MANUFACTURES AND MATERIALS

TERRA COTTA IN ARCHITECTURE.*

By Joseph Joiner.

In speaking of the treatment of terra cotta in architecture, I would commence by using the remark of one who has said "One of the most essential functions of architecture is expression, and all architecture should be, as far as possible, expressive of two things—its purpose and its construction. The question of purpose affects the general design of a building; the question of construction affects the special uses of the several materials composing it," and terra cotta really demands a special treatment at the hands of architects in order to produce the most satisfactory results. The uses to which terra cotta can, with more or less propriety, be applied are so many and so various that it is somewhat difficult to define where its application should commence and where it should cease. The plasticity of the material, whilst it gives great liberty and freedom to the designer and modeler, and as to artistic execution is capable of almost endless variety of treatment, yet from the nature of the manufacture it would, looking at it from the most successful and economical point of view, demand a limit as to the size of the individual blocks themselves. Terra cotta should not be made in too large pieces, as the larger the piece the more difficult it is to handle in the manufacture, and the greater the risk in the burning, and although I have seen some extraordinarily large columns and other work made by the Northwestern Terra Cotta Company and other companies, and which, as special pieces to suit a special purpose, were very good, they must have cost much labor and trouble and time in producing. I would not advocate pieces that would cube up more than six feet or seven feet, unless it is absolutely imperative for the sake of construction, and as much under this as possible, and the more readily and more easily a terra cotta block can be handled in the manufacture, the better the result, and I think the architect would be much helped in making his design and application of terra cotta work generally by paying an occasional visit to terra cotta factories and becoming acquainted in some measure with the manufacture, if only on the score of the old adage that "Ignorance is expensive, but knowledge is power." The most pleasing effects from the use of terra cotta will most surely come from those buildings that have been especially designed for terra cotta, because much can be done by the architect in studying his design to counteract and allow for any little irregularity of shape and outline contiguous to the material, for whilst it would be very difficult to design anything in terra cotta that could not be built in stone, yet a building could be designed for stone which could not be reproduced in terra cotta in the same way, and right here is where the co-operation of the manufacturer would be of much assistance to the architect. The matter of design and the manner of treating terra cotta are subjects for much thought, and require not only artistic ideas, but the exercise of good judgment, for if terra cotta is made to imitate stone, it immediately becomes a counterfeit; it is a deception, hence it is an error, and one of the greatest pleasures which arise from the use of terra cotta in architecture is the satisfaction engendered by the simple merit of the material.

RELATION TO BRICK AND STONE.

In speaking of terra cotta in combination with brick and stone, or in comparison with either one or the other, I would say that terra cotta has in itself more the nature of brick than stone. It can be used very successfully in combination with either one or the other, or both, according to the scope of the design, but its effect is often marred by the attempt to make it an imitation. Mr. Wagner, of the Northwestern Terra Cotta Company, says: "The great difference between terra cotta and stone is that stone is ready for its designation after receiving the finishing touch by the carver or mason, whereas terra cotta, when it leaves the hands of the modeler or presser, has yet to be dried and burnt, and this is a slow process, and one that is not always crowned with success, as a piece of terra cotta will sometimes warp and twist and crack and be off color. When stone is in the building it can be adjusted and worked up and the face wrought upon with a chisel, because the body of stone is homogeneous throughout, so that the same identical surface may be produced ad libitum, whereas terra cotta has but one surface, which, once destroyed, can never be restored. Ends and unexposed parts may be trimmed like stone, but the face cannot be touched after burning." In the matter of smaller pieces, in comparison with stone, and the necessary frequency of joints in terra cotta work, and which may be a point of objection with some architects, I would say this is remedied and overcome by making a lap or cover joint on all washes, and it must be conceded that the class of modeling and ornamentation that is now being produced in terra cotta is far ahead of the general character of all stone carving, for terra cotta modelers are not mere mechanics, but artists, and appreciate the value of beautiful figures and graceful lines. And as to the surface finish of terra cotta, whilst terra cotta should have its own particular finish, yet, if so desired, any kind of masonic finish can be placed upon the surface of it. Mr. Sullivan, of Chicago, the eminent architect, says: "The artistic possibilities of this fine material are limitless." There are several other important characteristics relating to terra cotta, and which make it stand preeminently to the front as building material, viz., color, strength, durability, fire-proof quality, adaptability for steel and iron construction, and economy.

COLOR.

In speaking of color, there is always a peculiar brightness in the general appearance of all terra cotta, which I think is due somewhat to the metallic condition of the ware after having been subjected to the high temperature of heat in burning, that lends a more cheerful aspect to buildings than any other building material known. Some twenty years ago two or three colors seemed to predominate, principally buff and red, but in the eighties an agitation of colors commenced, and demands for various colors were constantly being made, which demands were met as soon as they could be permanently and practically responded to by the manufacturers, until to-day enough colors can be produced to satisfy the most fastidious taste. I think a mistake is made where the terra cotta is required exactly to match the stone or brick in color. If the terra cotta part of the design has a special "motif" or expression, which it should have, that part of the design should most certainly be expressed in a slightly different shade of color to the brick or the stone—not too much to make it conspicuous, but enough to bring out the expression of the design readily, and here it would be well to add that architects must not expect perfection in the uniformity of color in every block of terra cotta, any more than the same expectation can be fully realized in the use of stone. Much has been said of late upon the subject of "white" or "cream" as a color, and many buildings have been erected with terra cotta of these shades of color, but it has yet to be proved whether these very light colors are the most serviceable to adopt in the atmosphere of our large cities.

STRENGTH.

As to strength, whilst terra cotta in itself has immense strength, both by way of support and resistance, yet it is never advocated that it should be placed into buildings in the same hollow condition that it comes from the factory, but, on the other hand, every block should be filled up solid with concrete or brickwork. The first crushing tests of terra cotta, as far as I can gain any information, were made in the city of London by David Kirkaldy on June 17, 1868, at the instance of Charles Barry, the architect, who had been using $140,000 worth of terra cotta in one building, Dulwich College, mentioned before, and amongst the many tests that were made I would present this one to your notice: A six-inch cube of Bath stone crushed at 88 tons per square foot; a six-inch cube of Portland stone crushed at 283 tons per square foot; a six-inch cube of solid terra cotta crushed at 442 tons per square foot. And which at once declared, at that time, the superiority of terra cotta over stone in this respect. Mr. James Taylor, in an article in the Clay-Worker, reports some crushing tests made in May, 1885, by the Boston Terra Cotta Company, which were eminently satisfactory, and which, in fact, showed a better result than the tests on the English-made terra cotta of previous years. Mr. Meyenberg, in the same paper, also bears testimony to the crushing strength of this material. Mr. Wagner, in the same paper, says: "The tensile strength of terra cotta is about 1,000 pounds per square inch; compressive strength about 10,000, and if the voids and the solid portions of a hollow piece of terra cotta were as one to one, it would compare favorably with good stone." Thus it will be seen that terra cotta is fully competent to sustain its proper proportion of weight in a building. The weight of hollow terra cotta with braces or reinforcements at intervals, made in the ordinary way, is about 70 pounds to the cubic foot, but when filled in solid it would weigh about as much as brickwork.

DURABILITY.

The advantage that terra cotta has in this respect needs no special proof in this paper, for they are all around us, and if we need a century proof in all ocular demonstration, we must surely wait a little longer. We know that timber will rot, stone will disintegrate, iron will oxidize, and all other materials will more or less yield to the destroying influences of the elements; but hard-burned terra cotta will stand in defiance of all weather.

FIRE-PROOF QUALITY.

Terra cotta is claimed to be fire-proof, and from what I understand of the results of our many recent fires, terra cotta did all that was claimed for it in this respect, and this is a very important matter, for in these days of tall buildings, under the present method of steel construction, it is very necessary that such materials be used, and in such a way as to render these "mammoth structures" or modern "bee-hives" as nearly as possible fireproof, hence the proper thing is to encase the iron work of the front of the building with terra cotta entirely, or brick and terra cotta combined, for stone is not a good fire-resisting material, and encase the iron framing with what is called "fire-proof terra cotta," so as to prevent the heat arising from a fire affecting it, for we know that if iron is not properly protected it becomes the frailest possible material in the event of a fire, but if properly protected it becomes an important factor in all high buildings.

As to the cost of terra cotta in comparison with stone, and which is the only building material that it legitimately comes in contact with in this respect (for galvanized iron, though much used, cannot be recognized in the category of constructional building materials), I would say that in perfectly plain work it is a sharp tussle between the terra cotta and the stone, and if it is a work of no repetition, stone is liable to be somewhat cheaper, for, although the cost of terra cotta, from increased experience and improved methods on the part of the manufacturers the past few years has been much reduced, the cost of stonework, from improved methods of cutting and planing, has been reduced also, but where there is much repetition of the same form, and where any amount of ornamentation is introduced in the mouldings, then the cost of terra cotta is far below that of stone, and the effect of all such ornamentation is, from the plasticity of terra cotta as a material in its clay state, far superior to anything that can be produced in stone.

In conclusion, I would like to say a word about setting terra cotta. Much terra cotta is marred by imperfect setting down by common brickmasons, and it can be at once seen that a good stonemason is the best man to set terra cotta. He can use a chisel, has been accustomed to set blocks of stone in alignment, and would be much more skilled in this connection with terra cotta than any ordinary brickmason. Hence a better job could be expected from a workman of this character. Terra cotta, when it arrives at the building should be laid down on some floor to ascertain the jointing that will be necessary to bring all the pieces together in good form, and thus the setter will become acquainted with each individual block, and what it requires at his hands, before he puts it into the wall. If a stonemason cannot be obtained, the next best man is one who has been accustomed to lay up best front brickwork. This is the final operation and requires just as much care and attention as any part of the manufacture.

* Abstract of a paper read before the Cincinnati Chapter of Architects.

A company has been organized at Owen Sound, with a capital of $25,000, to manufacture granolithic paving material.

Messrs. Reid & Brown, Front street east, Toronto, will shortly commence the manufacture of a hot water boiler for heating purposes.

A handsomely printed catalogue descriptive of the "Daisy" heater is being sent out by Messrs. Warden King & Son, of Montreal.

We are told by Cassier's Magazine that in spite of the fact that there are, at present, in existence at least nine or ten processes for rendering wood non-combustible, none of them have been adopted by the British admiralty, though all have been subjected to careful and repeated trials. The United States naval authorities tried one kind of non-inflammable wood on the armored cruiser Brooklyn some time ago, but have since taken it up and replaced it with ordinary wood. The German naval authorities, who are profoundly convinced of the necessity of using non-inflammable wood in the construction of their warships, have made numerous experiments in this direction during the past four years without any tangible results.

MANUFACTURE OF FIRE CLAY IN BRITISH COLUMBIA.

The Union Coal Co., of Union, Vancouver Island, B.C., have commenced the manufacture of fire brick on quite an extensive scale. The clay beds connected with the company's mines appear to be inexhaustible. The brick for the company's first set of coke ovens was manufactured from this clay. Subsequently the company determined to erect the necessary buildings and plant with which to make the bricks themselves. A kiln is being built near the coke ovens, and the fuel for its operation will be supplied by the gas generated in the manufacture of coke. The company's output of fire clay last year amounted to 1,600 tons, being three times greater than in 1894. Near at hand the company also own deposits of excellent building sand and gravel. A handsome building stone is brought from their own quarries, and the magnificent trees of fir, pine and cedar are cut into planks at the company's saw-mill, the only building material which it is necessary to purchase away from home being lime.

COLORS USED IN DRAWINGS.

A correspondent of the National Builder gives the following colors used to designate materials in architectural drawings:

Materials.	Colors to Represent Them.
Brass.	Gamboge.
Brickwork (in section).	Crimson lake.
Brickwork (in elevation).	Crimson lake, mixed with burnt sienna.
Cement.	Sepia.
Concrete.	Sepia, mottled with burnt umber.
Copper.	Crimson lake, mixed with gamboge.
Glass.	Cobalt (mottled).
Iron (wrought).	Prussian blue.
Iron (cast).	Payne's gray.
Lead.	Indigo.
Leather.	Vandyke brown.
Plaster.	Sepia.
Slate.	Indigo, mixed with crimson lake.
Steel.	Crimson lake, mixed with Prussian blue.
Stone.	Burnt umber.
Tiles.	Indian red.
Wood.	Burnt sienna.

THE TRADE JOURNAL.

There's a proper time for all things.

The proper time to make a business proposition to a man is when his mind is on business, when he is right in the thick of just the business you want to talk about.

When a man sits down and commences to read his trade journal his mind is on just the business you want to interest him in.

The question of what to buy and where to buy it is one of the things he depends upon the journal to solve.

If you have anything to sell him and your ad isn't there to tell him all about it, some other fellow's will be.

That's why the other fellow gets the trade and it's quite reasonable, proper and just that he should.—Chas. Austin Bates.

The aggregate value of brick buildings in course of construction at Windsor, Nova Scotia, is placed at $225,000 and of wooden residences $500,000.

The Robert McCausland Stained Glass Company, of Toronto, are busily engaged on the contract awarded them three months ago for decorative glass windows for the new municipal buildings.

The Mechanics' Supply Co., of Quebec, have recently received the agency from Mr. Samuel Cabot, of Boston, for "Deafening Quilt," an insulating material, in the manufacture of which eel grass is principally employed.

Cape Colony, during 1897, consumed 69,920,051 pounds of cement, and stone and slate of all kinds to a value of $95,935. In Cape Colony and Natal there were in 1897 in operation, 147 stone quarries, with only 78 employees, and 6 stone and marble works, with 256 employees.

The American Public Health Association will hold its twenty-sixth annual meeting in Ottawa on Sept. 27th, 28th, 29th and 30th next. By suggestion of the Montreal Master Plumbers' Association, a Committee on Sanitation, of which Mr. J. W. Hughes, the well-known Montreal plumber, was elected chairman, was formed last year. This committee will give its special attention to drainage, plumbing and ventilation of buildings, and is expected to present an interesting report at the above mentioned convention.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Making Veneered Doors.

VISITING a large woodworking factory some time ago, in New Haven, Conn., where veneered doors are made in large quantities, I interviewed the foreman with regard to the method of manufacture of these doors, with the following results: "Our first operation is to take common coarse white pine boards, with sound knots, and which have been well kiln-dried. The stock used is generally 16 feet long, 1 x 12 inches. This stuff is surfaced on both sides by a Daniels planer without regard to thickness, as some boards are thinner than others, while others are warped in drying, and the thickness of the boards is immaterial, perfectly seamed surfaces only being necessary. After the stock is planed up it is cut into such lengths as the bill of doors calls for. They are ready now to be glued up. The face board of whatever hardwood to be used is planed generally to ¾ of an inch thick, and is also run through a Daniels planer. The stock is now ready to go to the glueing press, and as the Daniels planer makes the best glueing surface in the world, no scratch planing is needed. After properly heating in a box the stock is brought out and carefully glued, the hardwood face parts marked for it. From three to five parts are put in the press at one time, and a pressure of twenty tons, brought down by screws, is put upon these parts. After remaining in the press the proper time they are taken out, and generally remain several days before being worked up, which gives the glue plenty of time to harden. When ready to work again these parts are taken to a Daniels planer and squared up, after which the parts are taken to a very nice cutting table or bench saw, and are cut up to sizes required, leaving them ⅛ of an inch large for future dressing. It is a positive necessity that the saw cuts free and clear, as heating has a tendency to warp the stock or spring it slightly, which would make it necessary to dress the stuff again. If the saw does not heat, the stiles come out perfectly straight, and these stiles can be laid on a Daniels planer bed, and a light shaving taken off. They are now straight, and if the saw table is in good condition, square, the other side may be finished with pony planer or with a Daniels, I prefer a Daniels, because it makes a better glueing surface, and if the planer is in good shape the work is turned out from the planer perfect, so far as square and surface are concerned. The work is now ready for the veneering, the thickness of which is immaterial, as it may vary from the thickness of thin paper to ¼ inch. Heated cauls are now used for the veneer, and the stiles, if heated at all, are just warmed, and the veneer glued on by piling up with a hot caul between each stile. The old fashioned way of making veneered doors may do very well when only two or three doors are to be made, but in these days of sharp competition we are obliged to adopt the quickest methods compatible with efficiency and good finish. I may say we never make less than fifty doors at a time."

A Few Pointers.

IT has been estimated that 100 square yards of woodwork will require for painting one coat, 20 pounds of white lead and 4 gallons of oil. The second coat will take 40 pounds of lead and 4 gallons oil; and the third coat will take the same amount of lead and oil as the second coat. For three coat work, on this basis, 100 yards will require 100 pounds of white lead and 12 gallons of oil. Tin valleys for shingle roofs should never be less than 14 inches wide and for slate roofs not less than 20 inches wide. The cost of laying in valleys, including cost of material, tinned nails, scaffolding and labor will be about nine cents per square foot. One man will lay 1½ squares per day of valleys in plain work; when roof is steep or valleys cut up one square is a fair day's work. Flashings for chimneys, and where one part of a building joins another, are worth, put in place, about ten cents per square foot, this, of course, includes everything. An approximate cost of gutters is about as follows: 4 inch are worth, put up, 10 cents per lineal foot; 5 inch gutters are worth 12½ cents per foot; 6 inch gutters are worth 15 cents per foot. Down spouts or conductor pipes cost as follows: 2 inch pipe is worth 8 cents per lineal foot; 3 inch pipes are worth 10 cents per foot; 4 inch pipes are worth 12½ cents per foot, and 6 inch pipes are worth 25 cents per foot. These prices, of course, are in full for material and labor in putting them in place. Additional cost will follow if the pipes are made square section and for elbows, also for ornamentation on face of gutters or on receiving hoppers. Something, too, must be allowed for the quality of tin employed; if the quality is different from 1 C, charcoal tin, which is the brand the figures given are taken from. Roofing tin comes in sheets, 14 x 20 inches, and a box of tin contains 112 sheets, so that, allowing the usual amount for side ribs and top and bottom laps, a box of tin will cover 182 square feet. Then if a box of tin costs six dollars which is the average price—the cost of a box of tin roofing will be about as follows:

Box of tin	$6.00
10 lbs. solder at 15 cts	1.50
Preparing tin for roof	1.50
Laying tin, 1 1/5 days at $2.25	2.70
Total	$11.70

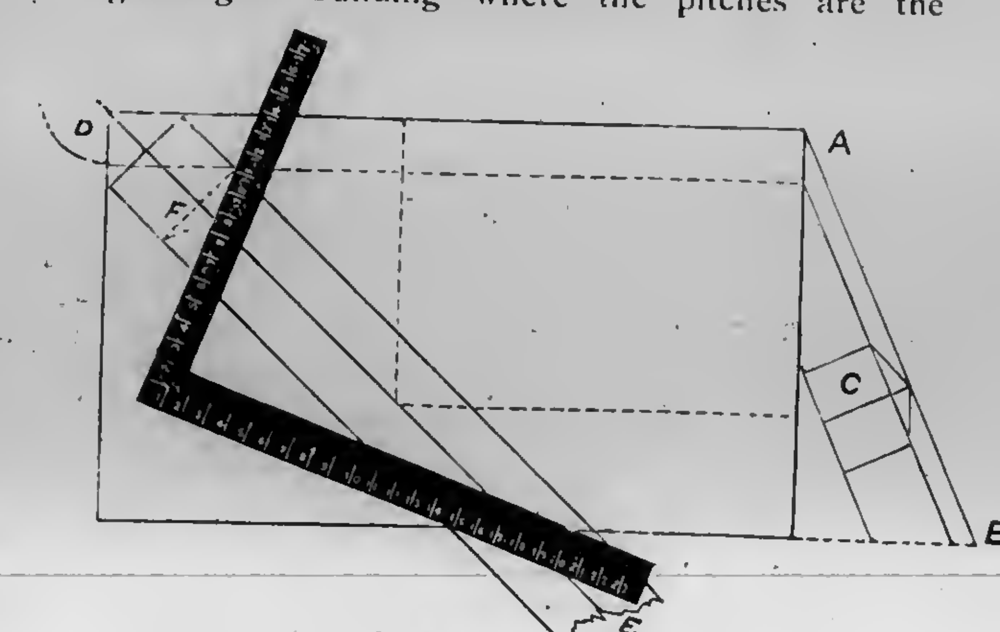
As this covers 182 square feet it brings the cost of tinning a roof to about six and a quarter dollars per square. In practice this is not enough to give the contractor any profit over and above the actual cost.

Pointing Up.

IN finishing off the outside faces of brick walls, the operation of pointing is often resorted to; this consists in filling up all the joints with superior mortar, and in the better class of work with cement. To properly "point" a wall requires great care, and indeed, some skill, where thorough neatness and finish in the joint are to be secured. Moreover, pointing requires to be conscientiously done, for much of the capability of a wall to resist the action of damp and of driving rains depends upon the way in which the joints are made good. The first operation of "pointing" is to remove all the mortar from the face of the wall which has been pressed out from between the bricks in placing them in bed; the mortar is next removed or raked out from between the joints with a tool made for the purpose, and for some distance inwards, this being done in order to give a "key" bond or hold for the mortar or cement used in the pointing. As a rule, all brickwork intended to be "pointed" or "tucked" is laid first with ordinary common brick mortar, the bond properly made and the walls kept plumb, and before the mortar is set hard it must be raked out of the joints about half an inch deep. When there is not much ornamental work in brick on the face of the building, the brickwork may be laid "overhand"—that is, the bricklayer may do his work from the inside of the building and then "tucked" or pointed from a swinging scaffold. In common brickwork, where the bricks used are of an inferior kind—that is, not pressed and of a uniform color, it may be necessary to stain the whole work, because some of the bricks are much darker than others, and give to the wall a mottled appearance when finished that is not at all pleasing. The first thing to be done in preparing for all kinds of tuck-pointing, is the cleaning down or washing of the walls to be pointed, and clearing them of all mortar stains or dirt. This should be done with a solution of muriatic acid and water, making use of one pint of acid to each pail of water used. That the acid may not leave any damaging effects after it, the work should also receive a cleansing of pure water immediately after the application of the solution. It is only necessary to clean as much of the wall at a time as can be easily reached by the workman doing the pointing. The next operation to be performed is the stopping. Red stopping is composed of one part of fine putty lime to three parts of fine white sand washed clean. This is colored with Venetian red and Spanish brown, and made to suit in shade as near as possible a brick colored with the intended stain. There should be sufficient stopping made at one time to complete the work, as it cannot be made a second time to have the same shade as at first. It takes three hods of stopping to point 200 feet of superficial brickwork, so it will not be difficult to find out how much will be required for the whole work. The stopping should be "stayed" with copperas, say one pound of copperas to every three hods of mortar or stopping, dissolved in hot water and incorporated when cold. The joints are then stopped or pointed in a rough manner, and no more should be done at a time than can be immediately finished by applying the putty joint before the stopping has become too hard. If this is not done, the putty joint will not combine with it as it ought, and it will fall off in a very short time. When a sufficient amount is stopped in, it is usual to rub it well with a piece of dry carpet or sacking, or something of that kind, and rub the stopping well into the pores of the bricks, that the work may appear as uniform as possible. When this is properly performed, the wall is ready for the color, which is composed of the same mineral paints as the stopping, Venetian red and Spanish brown, one pound of each to one and one-half gallons of water, and as these colors have no setting properties, it is necessary to add about one pound of copperas to three gallons of the stain, prepared in the same manner as for the stopping. Alum is also used in the same proportions; and sometimes half a gallon of stale beer to the same quantity of color for setting. Two ounces of red analine dissolved in alcohol will brighten up a barrel of the color, if such is desired. This is applied with a flat brush the usual way, after which the work is ready to receive the tuck joint, which may be rendered in either black or white joint or putty, and which will be described in next issue.

Backing a Hip Rafter By Aid of the S. Square.

THE illustration presented herewith exhibits two methods of finding the "backing" of the angle on a hip rafter. The methods are as simple as any known: Take the length of the rafter on the blade of the square, and the rise on the tongue, place the square on the line D E, the plan of the hip; the angle is given to bevel hip rafter, as shown at F. This method gives the angle only for a right-angled building where the pitches are the



BACKING A HIP BY AID OF THE STEEL SQUARE.

same, and for no other. The other method applies equally to right, obtuse and acute angles, where the pitches are the same. At the angle D will be seen the line from the points K L, at the intersection of the sides of the angle rafter with the sides of the plan. With one point of a compass at D, describe the curve from the dotted line, cutting A, then draw a line parallel to A B, the pitch of the hip. The angle bevel will then be found at G, which is a section of the hip rafter.

Painting Old Work.

IN estimating painting old work the first thing to do is to find out the nature of the surface to be painted, whether it is porous, rough or smooth, hard or soft. The surface of stucco, for example, will take a great deal more paint than one of wood, much depending on the circumstance whether it has been painted, and what state the surface is in. A correct estimate of re-painting wood work cannot be made from the quantities only; a personal examination ought to be made in every case where

there is much work to be done. In old work there is often scouring to be done, old paint to be removed, cracks to fill up, and extra sand papering to be done, that must be considered if the contract is to be made reasonably profitable. Painting old work without first cleaning and rubbing it down is sure to end in disappointment to some one concerned. It is impossible to make good work by applying paint to a dirty or unprepared base. When the work is to be grained the old paint should be removed or so rubbed down with pummice stone that the surface is as smooth and even as a plate glass surface, and after the first coat is applied it should stand for several days and should then be rubbed down with fine sand-paper and made smooth before the next coat is applied.

LONDON BUILDERS' EXCHANGE.

We are indebted to Mr. Geo. S. Gould, secretary-treasurer, for the following resume of the proceedings of the above exchange since the time of organization :

We were incorporated April 19th, under the name of the Builders'-Exchange of the City of London, for the various purposes specified in the declaration of incorporation.

We occupy very comfortable rooms in the Ontario Loan and Debenture Company's building, on the corner of the market, and they are in constant use.

Our board of directors have had plenty of work to do so far in preparing laws and rules for our guidance, and our general exchange meetings have been made interesting by the discussing of, and passing upon the same.

We have now upon our roll 70 members in good standing, 10 accepted applications as well as applications from the bricklayers, plasterers, plumbers and painters.

You will see from the enclosed list of names upon our roll that the exchange proper is composed of eight different sections. Every section having seven firms in good standing on their roll is entitled to elect a representative to the board of directors in addition to the trade director elected at the annual meeting of the exchange. Our sections as organized are as follows :

Bricklayers' Section.—President, Joshua Garratt ; vice-president, Geo. Everett ; secretary, C. Simpson, 422 Rectory street ; treasurer, Ed. Martyne ; delegate, John Nutkins. Meet every Monday at 8 p.m.

Carpenters' Section.—President, Wm. Tytler ; vice-president, Thos. Jones ; secretary, C. A. Smith, 90 Wharncliffe road ; treasurer, Jno. Shopland ; delegate, John Purdom. Meet every Thursday at 8 p.m.

Plasterers' Section.—President, J. G. Pritchett ; vice-president, John Fenn ; secretary-treasurer, Geo. S. Gould, rear of 292 Dundas st ; delegate, J. G. Pritchett. Meet every Tuesday at 8 p.m.

Manufacturers' and Dealers' Section.—President, John Logan ; secretary, J. W. Caurse, 93 York street. Meet every Monday at 8 p.m.

Painters' Section. President, Geo. Burdick ; vice-president, Ern. Fitzgerald ; secretary, Geo. Berry, 748 Princess avenue ; delegate, W. C. Morrison. The night of meeting is the first Thursday in every month at 8 p.m.

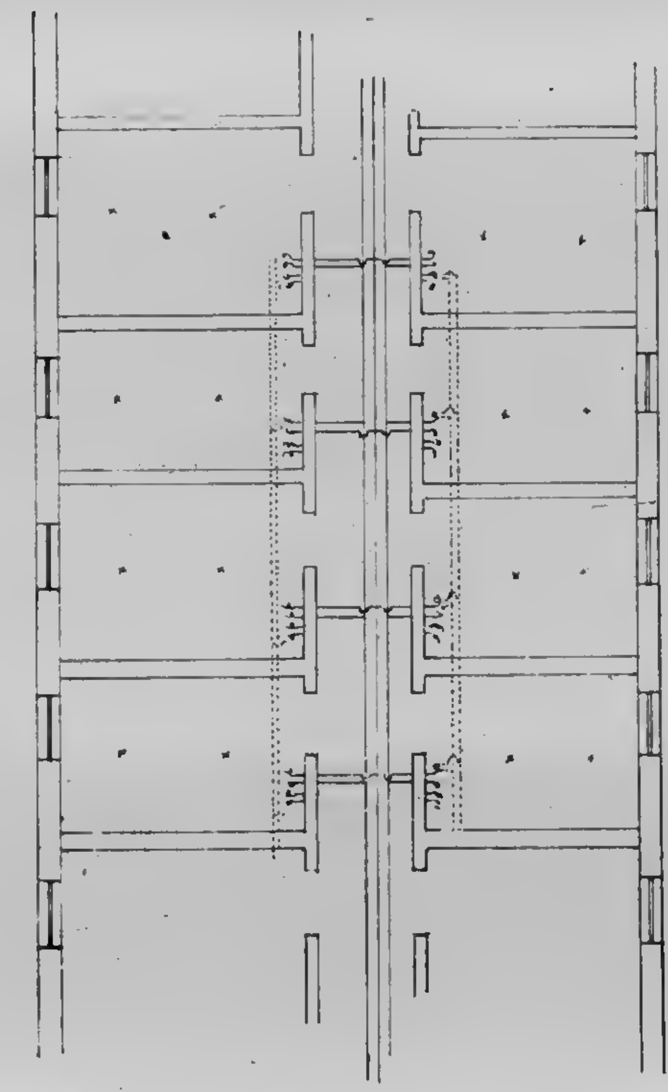
The plumbers are waiting until the applications for membership from the members of the Master Plumbers' Association, now before the board, are acted upon before proceeding to form a separate section.

The general meetings of the Exchange are held on the second Tuesday in every month at 8 p.m., and the Board of Directors on the Thursday preceding the general meeting at 8 p. m., and at other times when summoned by the Executive.

Our members are all busy at present, I believe, but the bulk of the work is being done at a very low figure.

WIRING OFFICE BUILDINGS.

Much difficulty is encountered in wiring office buildings on account of the necessity of having to alter offices, and the consequent changes to the wiring for electric light meters. The accompanying sketch illustrates to a certain extent a method adopted by Mr. H. F. Strickland, and which has been put into practical use. By it a building can be so wired that a suite of offices can be interchanged from one meter to separate meters, or vice versa. The sketch shows a section of an office building with a three-wire service in the corridor, with taps for each office. The four wires extending out of wall are two from service and two from outlets. The dotted lines might be termed a loop circuit, and by



Method of Wiring an Office Building.

this circuit the current can be either connected direct to each office through a separate meter or carried through one meter to all the offices, and the meter can be placed in either office. An additional cost of running two wires through the offices, with a tap coming out beside each meter outlet, will save considerable expense in the future. Mr. Strickland, the electrical contractor, 77 Adelaide street east, Toronto, is the originator of this method.

An increase of wages has recently been granted to the journeymen carpenters of Winnipeg.

The Plumbers' Union of Ottawa has instructed its members to refuse to sign rules adopted by Messrs. Butterworth & Co., under which workmen are charged for windows broken by them in houses where they work, and for the time of other employees in cases where work is imperfectly done and requires further attention.

A United States government report says heavy wood is harder than lighter wood ; the wood of the butt is therefore harder than that of the top ; the darker summer wood is harder than the lighter spring wood. Moisture softens, and seasoning, therefore, hardens wood. Wood is much harder when pressed longitudinally than when pressed transversely to the fibres, and it is somewhat stronger tangentially than radially. Though harder wood resists saw and chisel more than softer wood, the working quality is not always a safe criterion of its hardness.

RESULTS OF EXPERIMENTS ON THE STRENGTH OF WHITE PINE, RED PINE, HEMLOCK AND SPRUCE*

By Prof. H. T. Bovey, L.L.D., D.C.L.

In a paper read before the Canadian Society of Civil Engineers, in 1895, the results were given of a number of experiments on the transverse strength of timber beams ; but in the calculations it was assumed that the distortion, or diminution of depth at the bearing surface, was sufficiently small to be disregarded. It often happens, however, and especially when the timber contains a large amount of moisture, that the change in depth due to compression is excessive, producing a corresponding increase in the skin-stress. The method of conducting these experiments was fully described in the paper referred to, and therefore the following points only are noted :

All the transverse tests were made with the Wicksteed machine. The middle of the beam was supported on a hardwood bearing of 44 inches diameter. The two ends were forced down by rams under hydraulic pressure, which can be gradually increased at any required rate, or can be maintained constant for any given time. The end pressures were kept normal to the surface of the beam by means of spherical joints, which allow the end bearings to

TABLE I.

White Pine From Ordinary Stock.

No. of Beam.	Dimensions in inches. l.	b.	d.	Breaking weight. in lbs.	Skin stress (f) in lbs. per sq. inch. Max.	Min.	Mean.	Coefficient of elasticity in lbs per sq. in. E.	Sp. wt. in lbs. per cub. ft. at date of test.	Per ct. of weight lost when dried at 212 deg. F. at Centre.	Left end.	R't end.	Character of failure.
15	186	6.225	15.2	23,850	5.021	4,777	4,889	1,296,950	36.43	......	......	......	Crippled.
16	186	6.32	15.25	22,690	4,774	4,480	4,627	1,359,050	38.64	......	......	......	Longitudinal shear.
28	138	9.1	15.21	39,000	4,403	4,018	4,210	1,078,230	27.121	17.29	12.89	13.21	Longitudinal shear.
32	186	6.025	12.25	16,000	5,531	5,153	5,342	1,368,500	27.983	28.262	27.014	27.274	Crippled.
46	186	5.725	5.9	5,200	8,967	7,312	8,389	1,625,220	23.794	......	......	......	Crippled.

TABLE II.

White Pine Dried at 212° F.

No. of Beam.	l.	b.	d.	Breaking weight in lbs.	Max.	Min.	Mean.	E.	Sp. wt.	Centre.	Left end.	R't end.	Character of failure.
36	150	5.95	11.925	......	2,201	2,164	2,182	1,245,780	22.007	......	......	......	
38	75	2.965	5.925	5,000	5,911	5,569	5,740	1,272,440	22.105	......	......	......	Tensile.
42	150	5.7	5.9	8,000	9,538	9,247	9,392	1,282,770	20.674	......	......	......	Crippled.
43	150	6.05	11.725	23,000	9.992	7,091	8,542	1,171,240	22.648	......	......	......	Tensile.
													Tensile.

revolve. In previous experiments, the wire used in observing the deflections was found to be somewhat coarse, and a special wire was therefore drawn of .002-inch diameter.

The flexure theory is admittedly unsatisfactory, and frequently gives results which are contrary to experience. Possibly, when a certain limit has been passed there is a tendency towards equalization of stress, and the so-called neutral surface may be moved towards that portion of the beam that is best able to bear the stress. It may indeed be more correct to assume that the distances of this surface from the tension and compression faces are in the ratio of the ultimate tensile and compressive strengths of the beam. This assumption at all events seems to give results which are more in accordance with practice. For example, in the case of a cast-iron Tee bar, tested in the University Laboratory, the

TABLE III.

Red Pine from Ordinary Stock.

No. of Beam.	Dimensions in inches. l.	b.	d.	Breaking weight in lbs.	Skin stress (f) in lbs. per. sq. inch. Max.	Min.	Mean.	Coefficient of elasticity.	Sp. wt. in lbs. per cub. ft. at date of test.	Per ct. of weight lost when dried at 212 deg. F. at Centre.	Left end.	R't end.	Character of failure.
17	186	6.15	15.2	21,350	4,531	4,322	4,426	1,252,700	32.279	......	......	......	Crippled.
18	180	5.75	15.0	21,730	4,589	4,466	4,527	1,351,350	......	......	......	.....	Crippled and longitudinal shear.
31	186	5.975	12.275	23,400	7,840	7,469	7,654	1,814,190	35.95	17.38	16.9	12.94	Longitudinal shear.
45	186	6.025	6.025	7,600	10,034	9,871	9,952	2,768,630	37.144	......	......	......	Crippled.
49	188	5.75	14.925	22,700	5,240	5,100	5,170	1,669,010	30.592	8.8	8.7	8.1	Longitudinal shear.

TABLE IV.

Red Pine Dried at 212° F.

No. of Beam.	l.	b.	d.	Breaking weight in lbs.	Max.	Min.	Mean.	Coefficient of elasticity.	Sp. wt.	Centre.	Left end.	R't end.	Character of failure.
37	150	5.75	11.875	21,000	6,160	5,953	6,056	2,049,430	30.072	......	......	......	Longitudinal shear.
41	150	5.885	5.925	8,800	9,572	9.472	9,522	2,261,820	30.858	......	......	......	Tensile.
44	150	5.875	11.785	20,000	5,732	5,617	5,674	2,219,550	34.038	......	......	.....	Longitudinal shear.

tensile skin-stress should be 22,030 lbs. per sq. inch, and the compressive skin-stress 102,050 lbs. per sq. inch, whereas the ordinary theory gave 33,000 lbs per sq. inch as the tensile and 20,800 lbs. per sq. inch as the compressive skin-stress.

The following tables give the breaking weights, skin-stresses (transverse), coefficients of elasticity and specific weights of a number of air-dried, saturated, frozen and kiln-dried beams.

Beams 15 and 16 were sawn out of trees felled at Keewatin in 1894 and were received into the laboratory on the 13th of December, their weights being 415.75 lbs. and 457.78 lbs. respectively. They were both tested on the 2nd of February, 1895, when it was found that beam 15 had lost 36.69 lbs., or 8.8 per cent. of its weight, and that beam 16 had lost 46.59 lbs., or 10.2 per cent of its weight. When the beams were sawn through after the test they were still found to be completely saturated with water excepting for a depth of 1 inch from the surface. The beams were from the central portion of the trees, the heart running from end to end. Beams 28 to 43 were sawn from trees felled in water,

* From a paper read before the British Association for the Advancement of Science, Toronto, 1897.

1893-4, in Quinze Lake Co., P.Q. They remained in water one year, and were received into the laboratory on October the 4th, 1895. They were all first quality timber, and generally speaking, straight in grain and free from knots and shakes. In order to determine the excess of moisture in the timber, three slabs, one near the middle and one at each end, were sawn out of the beams immediately after they had been tested and were at once placed in a chamber kept at a temperature of 212° F. by steam pipes. The moisture was also removed from the whole beams by drying them in the same chamber. Beam 36 failed suddenly under a very small load, the fracture commencing at a knot in the tension surface. On examination it was also found that the grain on the face was oblique to the neutral surface, while there were shakes running from end to end in the neighborhood of the heart which, on the average, was below the middle of the depth of the beam. The results of this test should be discarded, as the beam was not of fair average quality. Beam 38 was cut out of beam 36 in such manner that the grain was straight.

Beam 43 failed under a breaking load of 23,000 lbs., but a somewhat long continued and slowly increasing deflection under a load of 22,000 lbs., seemed to indicate that at this point the beam failed in compression, although there were no apparent signs of crippling.

Remarks.—Beams 17 and 18, containing the heart, were cut from

TABLE V.

HEMLOCK FROM ORDINARY STOCK.

No. of Beam.	Dimensions in inches. l.	b.	d.	Breaking weight in lbs.	Skin stress (f) in lbs. per sq. inch. Max.	Min.	Mean.	Coefficient of elasticity.	Sp. wt. in lbs. per cub. ft.	Per ct. of weight lost when dried at 212 deg. F.			Character of failure.
25	222	8.815	10.1	13,000	5,132	4,995	5,063	1,581,710	53.025	50.43	39.93	47.85	Crippled.
26	186	8.975	10.015	20,000	6,615	6,371	6,493	1,498,640	36.533	......	......	......	Crippled.
29	186.	9.85	11.95	20,040	4,133	4,058	4,096	883,291	36.235	34.6	......	......	Tensile.

TABLE VI.

HEMLOCK DRIED AT 212° F.

No. of Beam.	l.	b.	d.	Breaking weight in lbs.	Max.	Min.	Mean.	Coefficient of elasticity.	Sp. wt. in lbs. per cub. ft.	Per ct. of weight lost			Character of failure.
40	87	4.35	4.925	3,500	7,946	5,054	6,500	1,379,860	31.346	......	......	......	Longitudinal shear.

TABLE VII.

HEMLOCK SATURATED AND FROZEN.

No. of Beam.	l.	b.	d.	Breaking weight in lbs.	Max.	Min.	Mean.	Coefficient of elasticity.	Sp. wt. in lbs. per cub. ft.	Per ct. of weight lost			Character of failure.
22	138	9.0	11.875	30,800	5,393	5,166	5,280	1,174,700	38.69	......	......	......	Tensile.
23	138	9.025	11.9	21,000	3,482	3,450	3,466	1,242,150	45.23	......	......	......	Tensile.
35	190	9.175	10.05	22,000	7,188	6,960	7,074	1,633,050	50.707	51.07	49.75	57.42	Crippled.

trees felled at Keewatin in 1894, and were ordinary 1st-quality timber. There were shakes in beam 17, reaching the heart at points. The grain on the lower half of the beam was straight, but ran cross-wise on the tension surface. From the time the beam was received into the laboratory to the date of the test, a period of 57 days, the beam lost 13 per cent. of its weight. After the test a 3-inch slab was cut out, and the weight of this slab on Feb. 15th, 1897, by which time the natural drying can be considered to have been completed, was found to be 28.037 lbs. per cubic foot. Beam 18 was tested after remaining in the laboratory 42 days, in which time it was found to have lost 8.79 per cent. of its weight. It failed by crippling and longitudinal shear, simultaneously. The grain for about 10 inches on each side of the centre was clear, straight and free from knots. The logs from which beams 31 to 49 were sawn were felled in the Bonnechere district in the winter of 1894—95, and remained in the water for six months. They all contained the heart, and were ordinary 1st-quality timber. Beam 32 failed by longi-

TABLE VIII.

SPRUCE FROM ORDINARY STOCK.

No of Beam.	Dimensions in inches. l.	b.	d.	Breaking weight in lbs.	Skin stress (f) in lbs. per sq. inch. Max.	Min.	Mean.	Coefficient of elasticity.	Sp. wt. in lbs. per cub. ft. at date of test.	Per ct. of weight lost when dried at 212 deg. F. at Centre.	Left end.	R't end.	Character of failure.
24	222	9.175	10.1125	15,800	6,208	5,846	6,027	1,629,050	32.307	26.7	24.7	27.3	Crippled.
27	186	8.725	10.025	14,600	4,899	4,758	4,829	1,458,360	29.354	......	......	......	Crippled.
30	186	8.728	11.875	15,900	3,758	3,682	3,720	2,020,300	30.603	11.1	......	......	Longitudinal shear.

TABLE IX.

SPRUCE DRIED AT 212° F.

No of Beam.	l.	b.	d.	Breaking weight in lbs.	Max.	Min.	Mean.	Coefficient of elasticity.	Sp. wt.	Centre.	Left end.	R't end.	Character of failure.
39	78	3.775	4.35	5,800	9,774	9,603	9,689	2,373,080	31.606	......	......	......	Longitudinal shear.

TABLE X.

SPRUCE SATURATED AND FROZEN.

No of Beam.	l.	b.	d.	Breaking weight in lbs.	Max.	Min.	Mean.	Coefficient of elasticity.	Sp. wt.	Centre.	Left end.	R't end.	Character of failure.
33	186	9.2	10	14,000	7,212	6,887	7,050	2,373,080	39.78	30.618	33.55	......	Crippled.

tudinal shear along a shake in the neighborhood of the neutral surface, but there were indications that this had been immediately preceded by a slight crippling.

Remarks.—Beam 22, 23 and 35, containing the heart, had lain in the water for a considerable time, and were completely water-soaked. When tested, beams 22 and 35 were found to be hard-frozen. Beam 23 was also frozen, but not throughout, as was shown when the beam was cut in two at the centre. Beam 22 was straight grained, free from knots, and failed with a sudden sharp fracture. Incipient decay had commenced near the heart of beam 23, which, however, was regarded as a fair specimen of ordinary commercial quality. It was full of large knots and the grain was curved from end to end. Beam 35 was straight grained, clear, comparatively free from knots and of exceptionally good quality; beam 40 was cut out of beam 35 after the latter had been tested. Beams 25, 26 and 29 all contained the heart. Beam 25 was a good specimen, and was completely water-soaked. Beam 26 was saturated throughout, excepting for a depth of 1½ inches from surface, and, although an apparently poor specimen, was considered to be of ordinary commercial quality. It was full of knots and its grain was curved.

Remarks. Beam 24 was wet, but was in good condition and comparatively free from knots. Beam 27 was of ordinary commercial quality, with fairly straight grain and a large number of small knots. Beam 30 was of ordinary commercial quality, but with large shakes run-

ning from end to end and dividing the beam practically into four sections. Beam 33 was water-soaked and hard-frozen when tested. It was of exceptionally good quality, free from shakes, and had clear, straight grain. Beam 39 was cut out of beam 33 after the latter had been tested.

In the transverse experiments the greatest possible care was taken to increase the load at the same uniform rate, the average time occupied in adding each increment and in taking the corresponding reading being slightly greater than one minute. In many cases the beam was loaded, then relieved of load, and reloaded again, the readings in all cases being carefully noted. This operation was sometimes repeated more than once. Whenever a beam or a specimen under tension or compression was subjected to repeated loadings, the first series of readings were almost invariably discarded as the increments of deflection, and changes of length were found to be more uniform after the preliminary loading. The initial loading seems to eliminate certain inequalities of resistance.

In beam 15 there was an increment of .401 inches in the deflection, corresponding to an increment of 7,000 lbs. in the load. On reducing the load to 500 lbs., there was an apparent set of .006 inches, which would have undoubtedly disappeared in a short time. Upon reloading the beam the increment of deflection for the same increment of load was .4 inch. In beam 17 the increments of deflection under the first and second loadings were exactly the same, viz., .415 inch for an increment of 7,000 lbs. in the load. When the load, after the first series of readings, was reduced to 500 lbs., there was an apparent set of .005 inch, which would have certainly disappeared had the beam been allowed to rest for a few minutes. In beam 24 (spruce), for an increment of 6,000 lbs. in the load the increment of deflection was 1.04 inch in the first loading and 1.034 inch in the second. Upon being entirely relieved of load, there was an apparent, but evidently only apparent, set of .01 inch. In beam 25 (hemlock), for an increment of 6,000 lbs. in the load, the increment of deflection was 1.165 inch in the first loading and 1.155 inch in the second, the apparent set when entirely relieved of load being .01 inch. In beam 27 (spruce), after being loaded and then entirely relieved of load, there was an apparent set of .005, which in two hours had fallen to .002 inch. In beam 26 (hemlock), after being loaded and then entirely relieved of load, there was an apparent set of .004 inch which had entirely disappeared after an interval of about two hours.

In the case of beam 28 (white pine), there were three sets of loadings, the increments of deflection corresponding to an increment of 12,000 lbs. in the load being: .238 inch and .234 inch for the first set, .237 inch and .232 inch for the second set, .237 inch and .232 inch for the third set.

When the beam was entirely relieved of load after the first set, there was an apparent sett of .002 inch, which had entirely disappeared in 25 minutes. The second set of loadings commenced after an interval of 18 hours. The mean increment of deflection = .2344 inch; the mean compression = .0827 inch, and, using the ordinary formula, the corresponding value of E = 1,066,980 lbs.

The increments of deflection for repeated loadings corresponding to an increment of 6,000 lbs. in the load were: .675 inch, .660 inch, .650 inch for beam 29 (hemlock), .335 inch, .330 inch, .337 inch for beam 30 (spruce), .492 inch, .485 inch, .487 inch for beam 31 (red pine), .675 inch, .655 inch, 653 inch for beam 32 (white pine), .313 inch, .305 inch, 305 inch for beam 49 (red pine).

The increments of deflection for repeated loadings, corresponding to an increment of 7,000 lbs. in the load, were: .625 inch, .620 inch, .620 inch, .625 inch for beam 33 (spruce). The increments of deflection for repeated loadings, corresponding to an increment of 5,000 lbs. in the load, were: .590 inch, .556 inch, .555 inch for beam 35 (hemlock).

For beams dried at 212° F., the increments of deflection for repeated loadings were: .420 inch, .400 inch, .405 inch, .405 inch, .405 inch for beam, 36 (white pine), and an increment of 6,000 lbs. .178 inch, .173 inch, .173 inch, for beam 37 (red pine), and an increment of 4,000 lbs. .039 inch, .042 inch, .040 inch, .040. inch, for beam 38 (white pine), and an increment of 300 lbs. .048 inch, .048 inch, .048 inch, .049 inch for beam 39 (spruce), and an increment of 300 lbs. .071 inch, .070 inch, .070 inch, .070 inch for beam 40 (hemlock), and an increment of 300 lbs. .363 inch, .358 inch, .358 inch, .363 inch for beam 41 (red pine), and an increment of 1,200 lbs. .669 inch, .672 inch, .675 inch for beam 42 (white pine), and an increment of 1,200 lbs. .411 inch, .416 inch, .408 inch, .402 inch for beam 43 (white pine), and an increment of 6,000 lbs. .243 inch, .240 inch, .238 inch, .241 inch for beam 44 (red pine) and an increment of 6,000 lbs.

From these results and from the further observations up to the point of fracture, the following inferences may at once be drawn: (a) The increment of deflection diminishes and therefore the coefficient of elasticity increases with the elimination of the moisture from the beam. (b) The increments of deflection are much more uniform in amount in the case of kiln-dried beams.

It is, of course, impossible to maintain a beam in a kiln-dried state. As soon as it is exposed to the atmosphere, it at once commences to absorb moisture, and the absorption continues until there is an equilibrium between the hygrometric conditions of the beam and atmosphere. The beam is then in its normal state, and the experiments indicate that the increments of deflection, corresponding to this state, are approximately uniform. The rate of absorption depends essentially upon the nature of the timber, and proceeds more slowly as the density increases. The weight of a central 2-inch slab of beam 30 (spruce), increased 3.6 per cent. in 24 days, and 8.5 per cent. in 47 days. The influence of moisture on the deflection of a beam was well illustrated in the case of 15 inch x 6 inch Douglas fir beam on 186 inch centres. On June 15th, 1895, it was placed in position and was loaded with a weight of 1,000 lbs. at the centre, producing a deflection of .071 inch. The daily observations, extending over several months, showed a continually increasing deflection, until, by the evaporation of the moisture, the beam had attained its normal state. The average deflection now remained constant, varying, for example, between .09 inch on August 24th, and .082 inch on September 2nd, the greater deflection of course corresponding to an increase of moisture in the atmosphere. On the 4th of September the load was increased to 2,000 lbs., which produced a deflection of .127 inch. This load remained on the beam until January 8th, 1896, the deflection during the same period varying between .129 inch and .114 inch.

Of 20 non-kiln dried beams, 11 failed by crippling on the compression side, 6 failed by longitudinal shear, and 3 hemlock beams only failed by the fracture on the tension side. The experiments on the direct tensile and compressive strength of the timbers show that this is precisely what might be expected to take place. In every case the direct tensile strength is very much greater than the direct compressive strength, and failure by crippling is likely to take place under a load much less than the material could bear in tension. Under all circumstances, therefore, in practice, it is advisable to place a beam so that the portion of the timber which is strongest and in the best condition should be in compression. Again, the experiments conclusively show that kiln-drying enormously increases the direct compressive strength, but greatly diminishes the shearing strength, while the direct tensile strength does not appear to be much affected, although in the majority of cases it was diminished, and sometimes considerably. The large increase of strength in compression due to kiln-drying might have been naturally expected, as in the process of drying the walls of the cells are stiffened and hardened, and thus become better able to resist a compressive force. The walls, however, are at the same time much more brittle, and it is possible that a sudden blow might cause the failure of a kiln-dried column, which would have remained uninjured had the moisture not been eliminated. It may also be of interest to note that in the re-tests of specimens after the injured portion had been removed, the compressive strength was, almost without exception, increased. Hence, by kiln-drying a beam its compressive strength is made to approximate more closely to its tensile strength, and its transverse strength is consequently sometimes considerably increased. It must be remembered, however, that this kiln-drying invariably largely diminishes the shearing strength, and therefore proportionately increases the tendency to shear longitudinally. Thus, of the nine kiln-dried beams in the preceding tables, only one failed by crippling while four failed by fracture on the tensile side and four failed by longitudinal shear. Indeed, generally speaking, kiln-dried beams will fail either by a tensile fracture or by a longitudinal shear, and this result has been further verified by experiments subsequent to those referred to in the present paper.

In practice, of course, beams cannot be maintained in a kiln-dried state, but they rapidly pass into the normal state. The question of how far it is desirable to eliminate the moisture depends essentially on the balance to be maintained between the tensile, shearing and compressive strengths, and a beam should always be placed so as to exert its relative strength to the best advantage. Kiln-drying, unless some special method of prevention is adopted, develops shakes in the timber and causes existing shakes to become more pronounced. Some of these shakes often extend to a great depth, and run the whole length of the beam, so that it not infrequently happens that only a slight layer is left to hold the beam together. Such a beam, although otherwise sound and clear, offers very little resistance to longitudinal shear, and might more justly be regarded as being made up of two or more superposed beams.

PLUMBING IN OTTAWA.

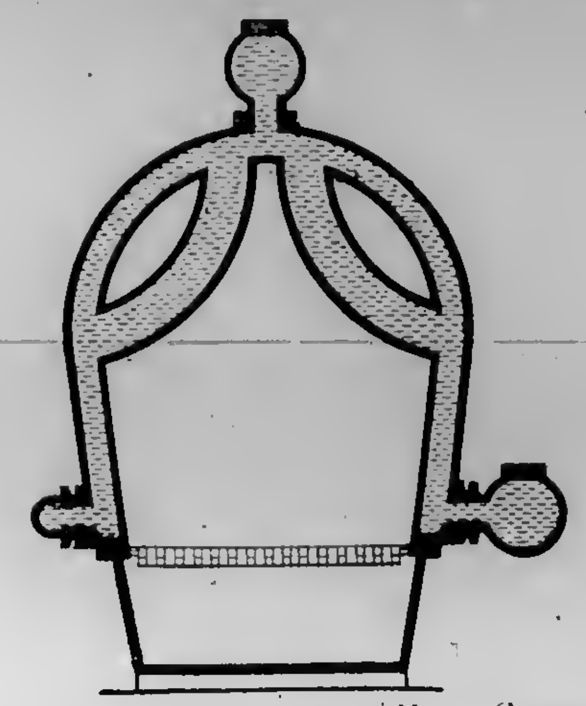
THE Master Plumbers and Plumbers' Union of Ottawa have appointed a committee to interview the Council and learn why the plumbing by-law passed in 1893 has not been enforced. The by-law calls upon every master plumber to take out a license at $2 per year, and to give a bond of $200 as a guarantee of good work; the license fee for journeymen plumbers is 25 cents. It is claimed that the health of the citizens has suffered because of defective plumbing work done by incompetent and irresponsible firms, and the Council will be urged to enforce the law for the future, and to incorporate in it a provision that iron pipe in houses should be carried through the foundation and protected by a stone arch, so that when the foundation sets the drain still remains unimpaired.

WAXING FLOORS.

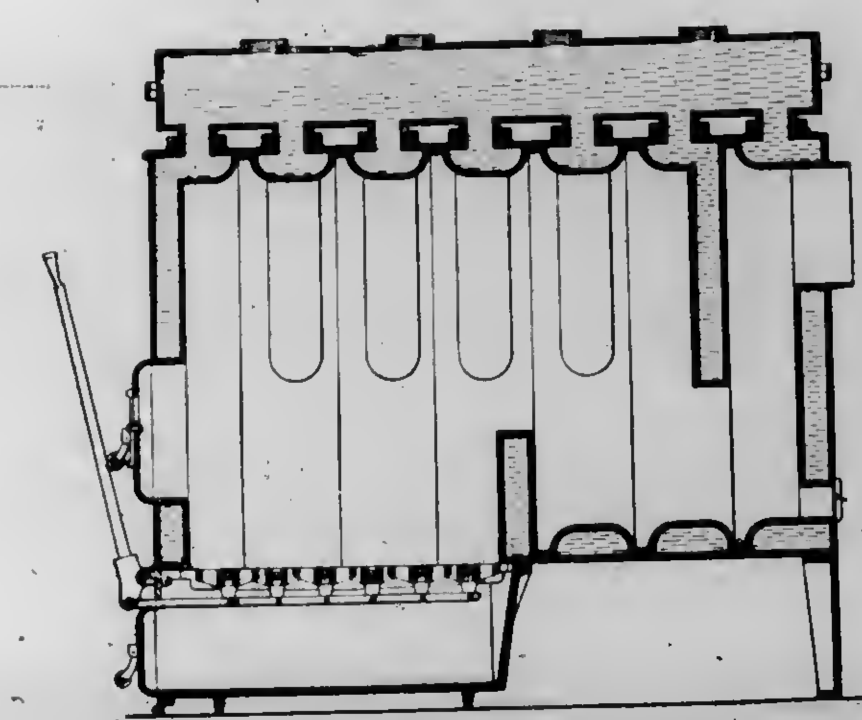
AN excellent method for waxing floors is as follows: Take a pound of the best bees wax, cut it up into very small pieces and let it thoroughly dissolve in three pints of spirits of turpentine, stirring occasionally, if necessary. The mixture should only be a trifle thicker than the clear turpentine. Apply it with a rag to the surface of the floor, which must be perfectly clean. This is the most difficult part of the work; for, if too much or too little is put on, a good polish is impossible. The right amount varies, less being required for a hard, close-grained wood, and more if the wood is soft and open-grained. It is best to try a foot or two of the floor before going over the whole. Put on what may be considered enough and leave the spot untouched and unstepped on for twenty-four hours, or longer if needful. When thoroughly dry, rub with a hand brush. If it polishes well, repeat the process over the whole floor. If it does not, remove the wax with fine sand paper and try again, using more or less than before, as may be necessary; and continue experimenting until the desired result is secured. If the mixture is slow in drying, add one part japan to six of turpentine.

THE "ROBB" HOT WATER HEATER.

THIS heater was designed and patented by Mr. D. W. Robb and is manufactured by the Robb Engineering Co., of Amherst, N. S. A number have been placed in buildings in different parts



THE ROBB BOILER—SECTIONAL VIEW, CROSSWISE.



THE ROBB BOILER—SECTIONAL VIEW, LENGTHWISE.

of the Maritime provinces during the past two years, and are said to have given highly satisfactory results.

The heater, as described by the manufacturers, consists of a number of upright cast iron sections of the general shape of a horse shoe, with circulating pipes on each side of the crown. The height is much less than in most others types, permitting of its use in very low cellars, and as it may be shipped in sections it is easily taken into any building through the doors or windows. It is provided with rocking grates extending about half the length of the heater, which are easily operated by a lever. The hot gases are directed upward by a fire bridge at the rear of the grate and then downwards by a shield which prevents them escaping too quickly out through the smoke pipe. The part of the outer rim of each section that is exposed to the fire is curved, increasing the heating surface very largely.

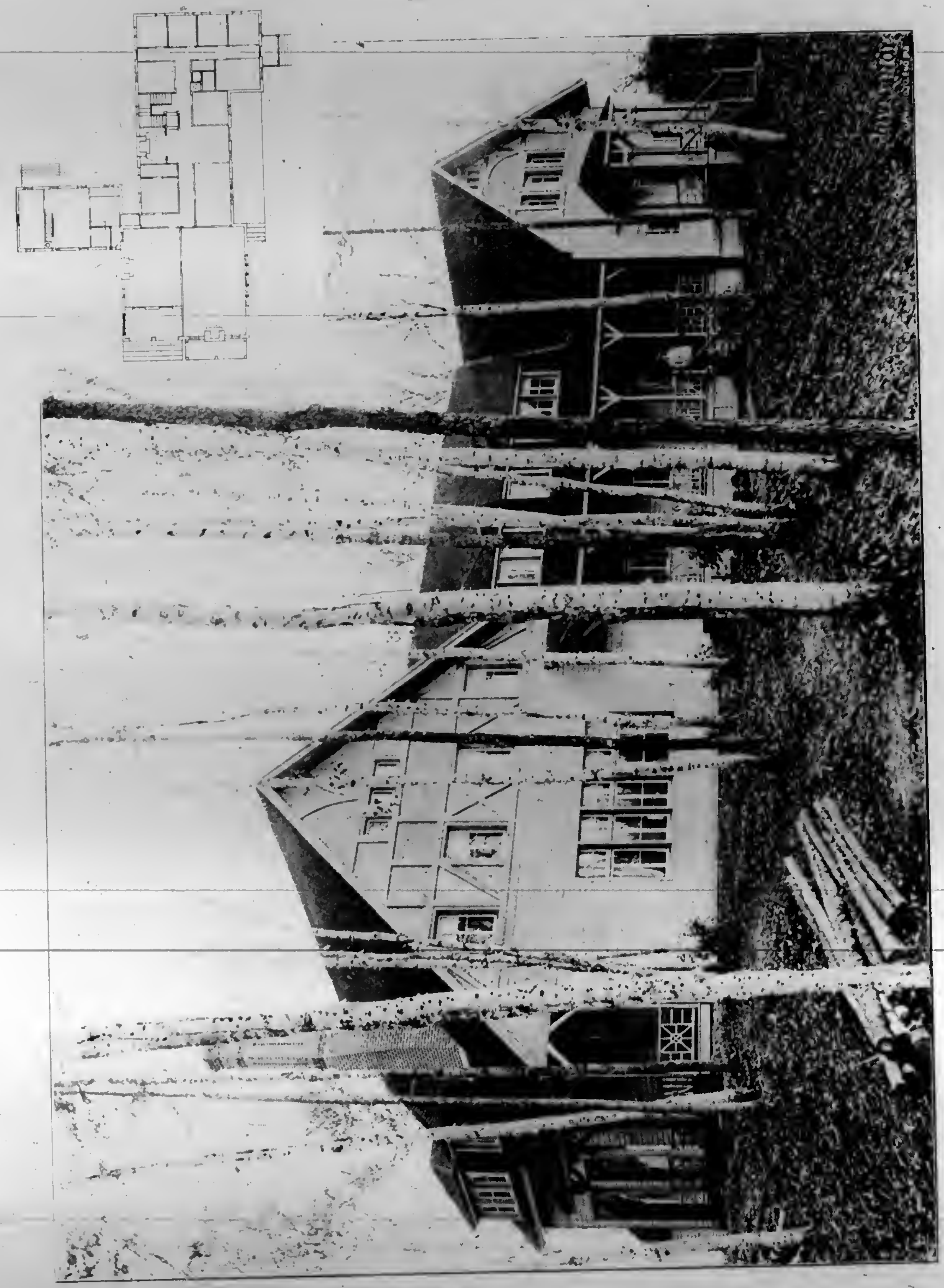
On account of the shape of heating surfaces and their direct exposure to the flame, soot cannot collect. This allows of the

use of soft coal as well as hard without cleaning out and keeps the heater always at its highest efficiency. The flame being in one large body admits of more perfect combustion or greater heat than is obtained where it is divided into thin sheets before the gases are fully ignited.

The water circulates from the return headers at the bottom to the flow header at the top in an almost vertical direction. The movement is therefore very rapid, giving much quicker heating than is usually secured with hot water. This rapid circulation also assists largely in the economy shown by this heater, as it is necessary for the best results that the water should escape as fast as heated, allowing colder water to take its place.

The main thing to be thought of in the erection of scaffolding of any kind is that men have to risk their lives and limbs on it, and that true economy in its erection is that which makes it safe beyond a doubt, and there should be no sparing of time, labor or money in accomplishing that end.

Store at Berlin, Ontario.
W. A Langton, Architect.

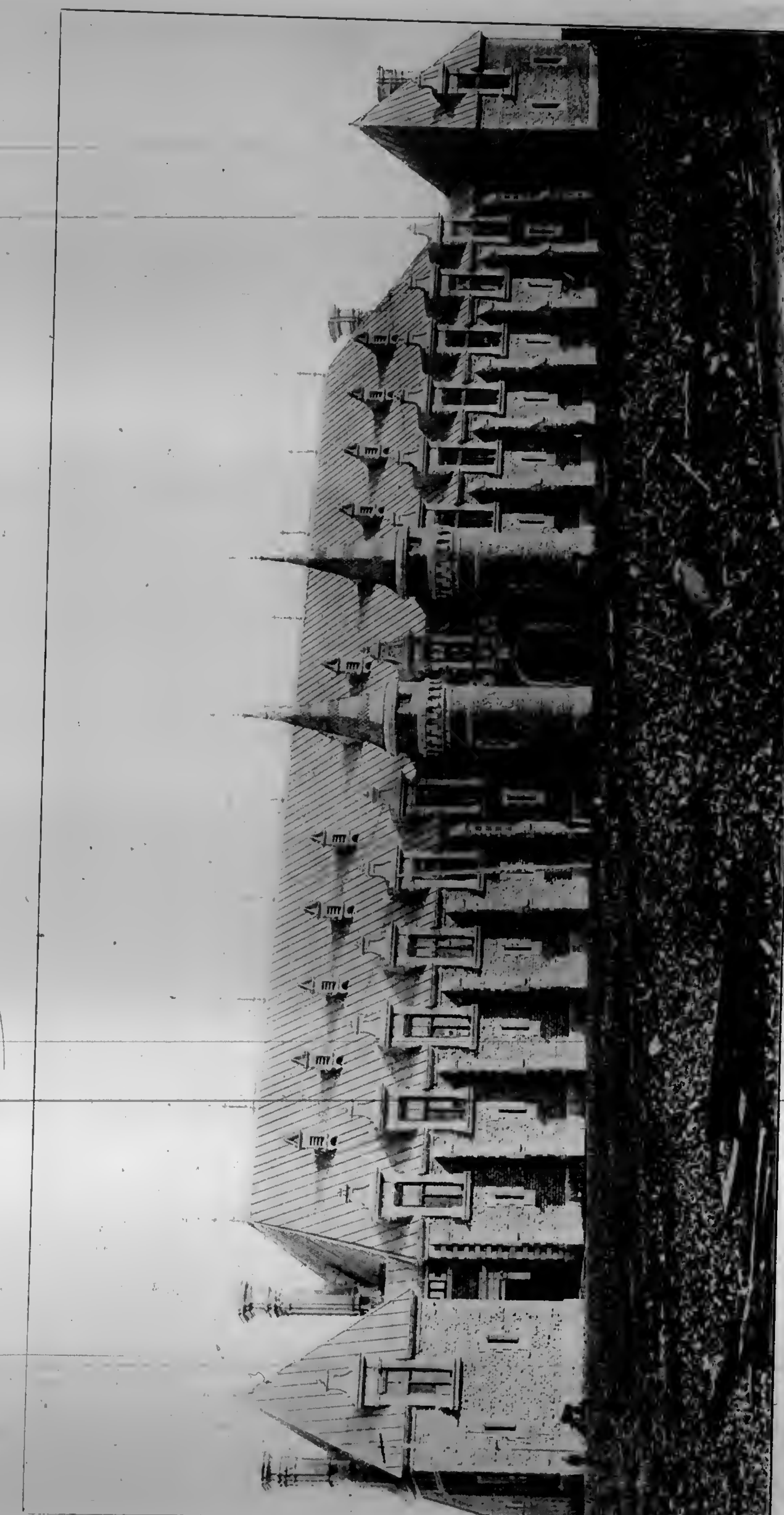


Club House of the Triton Fish and Game Club, Lac a la Croix, Quebec.

Harry Staveley, Architect.

Residence at Fort William for Mr. Cameron, Supt. C. P. R.

Simpson & Ellis, Architects.



Drill Hall, Quebec.

E. E. Taché, Architect.

CANADIAN ARCHITECT AND BUILDER.

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—THE—

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ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery.

The British Employers' Liability Act. THE owners of stone quarries in Great Britain have set the example to employers in other lines affected by the Employers' Liability Act by increasing the stringency of regulations imposed on workmen for the avoidance of accidents. Aged workmen are especially warned, under threat of dismissal as a class, to shun every avoidable risk. It is explained that this extra precaution has been rendered compulsory by the enormous liability imposed by the act. The fear is expressed that the measure will result in depriving of employment a large number of the older workmen.

Artizans' Dwellings. MR. A. F. WICKSON, of Toronto, vice-president of the Ontario Association of Architects, has recently been honored by being invited by the Massachusetts Charitable Mechanic Association to take part with fourteen leading American architects in a limited competition for designs for artizans' dwellings. The fifteen competitors have elected by letter ballot the following well-known architects to comprise the jury who shall judge the merits of the drawings submitted and decide the competition:—Prof. Chandler, of the Massachusetts Institute of Technology; Prof. H. L. Warren, of the Lawrence Scientific School, Harvard University; and Mr. J. M. Carrera. These gentlemen will also decide the merits of the public competition for the same object, particulars of which were recently announced in our advertisement pages.

Speculative Building in Montreal. A CORRESPONDENT writes that speculative building in Montreal has been carried on to an unwarranted extent of late. Purchasers and tenants have not kept pace with building operations, consequently there are numerous failures among this class of builders, who as a rule are not financially strong. The method usually pursued by these speculative builders is to secure a desirable site, pay cash for the land and borrow and get credit for the building. If purchasers or tenants cannot be found for the completed building, the builder is forced into bankruptcy, and the firms who supplied him with the materials necessary to enable him to carry on his operations are saddled with the bulk of the loss. Our correspondent states that the limited extent of building enterprises

of a non-speculative character, and the consequent difficuly experienced by manufacturers and dealers in finding an outlet for their goods, has led them to assume large risks in the way of selling on credit to irresponsible persons. As a result of this laxity of credit, irresponsible parties are enabled to recklessly underbid and undersell responsible firms.

The Brick Market.

BRICK manufacturers in the neighborhood of Toronto are all operating their works at full capacity, and find difficulty in keeping pace with the demand. Many of them have orders ahead which will require the balance of the season to fill. At present it appears that little if any stock will be carried over, and builders who do not now succeed in buying sufficient material to meet their requirements until next year's stocks can be put on the market are likely to experience a time of enforced idleness when the season of 1899 opens. The unexpected extent to which building enterprise has revived in Toronto the present season, after several years of unexampled dullness, found the brick manufacturers with no surplus stock on hand.

Students' Competition.

ATTENTION is directed to the particulars of a students' competition appearing in the Students' Department of this number. The subject of the competition is four ornamental chimneys. It is hoped by this means to direct the attention of the rising generation of architects, as well, perhaps, as of architects already in practice, to the value of chimneys as features in building design. This subject, which has received so much attention in European countries, seems to have been to a considerable extent overlooked in connection with our native architecture. Fortunately, however, there are exceptions to this rule, and it is possible to point to buildings, the artistic and pleasing appearance of which is almost entirely due to a single well designed and located chimney. Architects are urged to bring this competition to the notice of their students, with a view to inducing them to take part.

The New Westminster Disaster.

IN spite of increased attention on the part of municipalities, the insurance companies and individuals, to the subject of fire protection, we are frequently reminded of the great risk from fire which still prevails. Last year the town of Windsor, Nova Scotia, was wiped out in a day; the sturdy young city of New Westminster, at the opposite end of the Dominion, is this year the victim. The loss, which, exclusive of insurance, is estimated at $2,000,000, must fall heavily on the shoulders of such a young community. Doubtless, however, the enterprising spirit so abundantly manifested by the people in the original development of the city, will be equal to the present emergency. Already the Dominion government and some of the corporations whose buildings were destroyed have announced their purpose to rebuild immediately. The mildness of the climate will permit of building operations being continued throughout the winter, while the same cause will greatly mitigate the discomfort of the homeless citizens. The substantial character of most of the buildings destroyed is to a large extent a guarantee that they will be replaced by structures at least equal if not superior as regards durability of character. In the light of the present experience, the municipal authorities will also doubtless insist on the employment of every reasonable precaution against fire.

Mexican Federal Palace Competition.

THIS competition, the principal conditions of which were printed in these columns, has recently been decided. As was anticipated, in view of the unsatisfactory character of the conditions, the competition has not proved successful. Only one or two architects of prominence submitted designs, and not more than seven or eight sets of drawings out of all that were submitted were worthy of special notice. As none of the competitors complied with the published conditions, the jury, which by the way was entirely under the control of the government, decided to divide the first prize of 15,000 pesos among three competitors named for second place, viz., Pio Piocentini and Philippo Nataletti, Mexico; J. P. Weber, Chicago, and Adam Boori (place of residence not given). The third prize was awarded to Pietro Paolo Quaglia, Mexico; the 4th prize to Antonio Rivas Mercado. It is estimated that the cost of any of the premiated designs would exceed by at least 50 per cent. the limit of 1,500,000 pesos.

Windowless Buildings.

MR. Howard Constable, who a few years ago was a successful competitor for the position of supervising architect of the United States, is the author of a scheme for the erection of windowless tall buildings on expensive sites. It is proposed to furnish such buildings with entirely artificial light, instead of a combination of natural with artificial light, as at present. Ventilation would be provided by a system whereby fresh air would be brought in from the roof in pipes and conducted in proper quantities to the various rooms throughout the building, while the impure air would also be expelled through pipes, which might be charged with chemicals so as to destroy disease germs with which it might be impregnated. The advantages claimed for this style of building are that the space now required in such buildings for a central court for lighting purposes would be available for use and would add considerably to the revenue; that the absence of window openings in the outer walls would greatly lessen the fire hazard; that all rooms in such a building would be equally desirable; that smoke and foul air which now enter through windows would be excluded, and that if the architect were relieved from the necessity of figuring out the problem of how to successfully light so many scores of rooms, he could make his facade much more beautiful. The author of this ingenious if somewhat impractical theory of construction admits that the public is not likely to immediately fall in with his ideas, but proposes that his theory should at once be put in practice by reducing the number and size of window openings in buildings of this class to be erected in the future, and by glazing them with wire mesh glass, which would resist the action of fire.

Ineffective Building Laws.

BEYOND the fact that the Toronto building by-laws are sadly deficient in construction, there appears to be reason to question also the efficiency if not the impartiality of those whose duty it is to enforce them. A conspicuous violation of the law is now to be seen on Yonge street, where the owners of a departmental store have been permitted to erect a tower of wood and what is practically a wood front to their building, thereby increasing the fire hazard in a congested business district. It is said that the owners of this same store were also permitted to greatly exceed the maximum of undivided floor area fixed by the by-law, in consideration of having installed a system of overhead automatic sprinklers, but that no supervision was exercised by the city over the method of construction. As a result, the system is said to be very defective if not useless, owing to the fact that the piping is not arranged so as to equalize the pressure, and the overhead sprinklers are spaced ten instead of five feet apart. If these reports are correct, the owners of this and adjoining property are living in false security. It is not to the credit of the City Council that the building by-law so carefully drafted and submitted to the council by the Ontario Association of Architects several years ago should have been allowed to remain unconsidered, more particularly in view of the several disastrous fires which have occurred subsequent to its preparation. If no effort is to be made to improve the existing by-laws, it is at least the duty of the city's officials to see that present safeguards are not flagrantly violated.

BY THE WAY.

THE death is announced in Toronto of Mr. Robert Robertson, contractor, who is credited with having placed in position the weather vane of St. James' Cathedral, the height of which is upwards of 350 feet. The man who can do a job of that sort must be acknowledged to possess of level head.

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IN connection with the Bushnell Oil Company's works at Sarnia, Ont., there is a steel tank capable of holding 30,000 barrels of oil. Being desirous of removing this tank to a new location, a short distance away, the novel expedient is to be tried of making an artificial lake, across which the tank will be floated to the required position.

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As illustrating how quickly a wide-a-wake business man sometimes takes quick advantage of suddenly presented opportunities, a writer in Brick, of Chicago, tells how Mr. W. Alsip, of Grand Forks, Dakota, hearing that an attempt was being made to "corner" the price of brick at Winnipeg, gave orders that a brick-making plant which he had loaded on a train for new works he was about to establish at Fargo, should immediately be shipped to Winnipeg. As a result of this hastily formed decision Mr. Alsip has now a large brick manufactory in the capital city of our Northwest, and is assisting by his energy to promote its growth and welfare.

× × ×

As illustrating the lack of sympathy and common sense which sometimes govern the actions of trade union leaders, the American Architect tells of the following incident: "A certain workman, who had "gone out" with his fellows when a strike was declared, was being partly supported in his enforced idleness by his union and its sympathizers. Being a decent sort of a fellow, seemingly, he one day took a broom and swept off the pavement before the little tobacco shop of his sister, with whom he boarded, but alas! he was seen engaged in this for a striker degrading occupation by a walking delegate or other spy, and at once his strike money was cut off, because, forsooth, he had worked!"

PREPARING TRACING PAPER FOR ARCHITECTURAL USE.

TRACING paper may be prepared for architectural use by taking common tissue or cap paper of any size, laying each sheet on a flat surface and sponging over one side with a solution composed of 2 parts of Canada balsam and 3 parts spirits of turpentine, to which a few drops of old nut oil has been added, taking care not to smear any part of the surface of the sheet. According to one of our foreign exchanges a sponge is the best instrument for applying the mixture, which should be used warm. As each sheet is prepared, it should be hung up to dry over two cords stretched tightly and parallel about 8 inches apart, to prevent the lower edges of the paper from coming in contact. As soon as dry the sheets should be carefully rolled on straight and smooth wooden rollers about 2 inches in diameter covered with paper. The sheets are dry when no stickiness can be felt.

In order to render tracing paper more translucent so as to allow the finest lines to be seen through it, soak it in benzine by means of a cotton pad so as to thoroughly permeate the fibre. For rendering opaque drawing paper translucent so as to permit of a photographic image of a drawing done on it to be depicted on some of the highly sensitized papers, there is nothing better than to saturate it with benzine. As this rapidly evaporates the paper will resume its normal opaque appearance without showing any trace of the treatment to which it has been subjected.

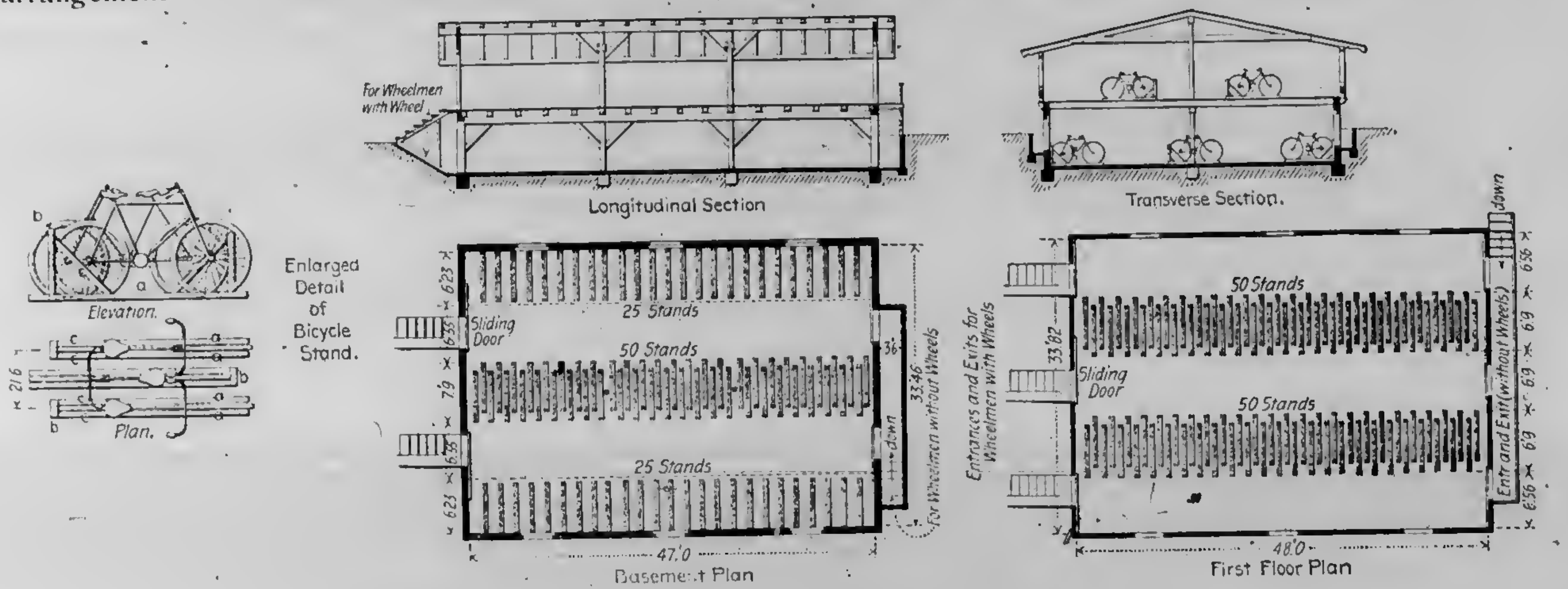
Another process of rendering ordinary drawing paper transparent consists in dissolving a given quantity of castor oil in one, two or three volumes of absolute alcohol, according to the thickness of the paper, and applying it by means of a sponge. The alcohol evaporates in a few minutes, and the tracing paper thus made is dry and ready for use. The drawing can be made with lead pencil or india ink, and the oil removed from the paper by steeping it in alcohol, when the paper assumes its original condition.

COLOR IN HOUSE DECORATION.

A HOUSE decorator writes: The thermometer seems to fall about six degrees when you walk into a blue room. Yellow is an advancing color, therefore a room fitted up in yellow will appear smaller than it is. On the other hand, blue of a certain shade introduced generously into a room will give an idea of space. Red makes no difference in regard to size. Green makes very little. If a bright, sunny room gets its light from a space obtruded upon by russet colored or yellow painted houses, or else looks out upon a stretch of green grass, it should be decorated in a color very different from the shade chosen if the light comes from only an unbroken expanse of sky. Red brings out in a room whatever hint of green lurks in the composition of the other colors employed. Green needs sunlight to develop the yellow in it and make it seem cheerful. If olive or red brown be used in conjunction with mahogany furniture the effect is very different from what it would be if blue was used. Blue would develop the tawny orange lurking in the mahogany. If a ceiling is to be made higher, leave it light, that it may appear to recede. Deepening the color used on the ceiling would make it lower, an effect desirable if the room is small and the ceiling very high. Various tones of yellow are substitutes for sunlight.

BICYCLE STORAGE HOUSE.

We reproduce from Engineering News the accepted plans of a bicycle storage warehouse, submitted in a competition recently instituted by the Prussian "Ingeneur und Architekten Verin." Those taking part in the competition were instructed to design a low building, occupying a minimum area and having a storage capacity for 200 bicycles; these latter to be so stored that they could be put into place and removed again with the least confusion and loss of time on the part of the workmen. As seen by the drawings, two parallel floor strips a, end posts b, and two inclined struts c, keep each bicycle in place; and these racks are so spaced as to take up the least room on the floor. The separate passageways, each with its own entrance door for wheelmen, permit access to the racks without confusion; and separate exits at the opposite end of the building further facilitate this ease of movement. It will be noted that the entrances are provided with steps for the men with an incline at the side for the bicycles. The exits have a common platform with but one stairway. The plan calls for a two-storied structure, with 100 wheels on each floor. The difference in the floor arrangement of the racks is made to facilitate the location of the entrances; three stairways giving access to the upper floor and two stairways, placed between the others, descending to the basement floor. The successful competitor was Mr. Carl Bernhard, engineer and architect.



Design for Bicycle Storage House of 200 Wheels Capacity.

AIR INSULATION IN BUILDINGS.

We are told that nothing keeps cold and heat out better than a layer of air; hence the use of horizontal and vertical air passages and of hollow walls in our buildings. When Russner published an account of some experiments a year ago which contradicted this view, he found, says the "Zeitschrift fur Architectur und Ingenieurwesen," very few supporters besides men like Astfalck and Nussbaum, who had come to the same opinion from other considerations. Russner's experiments were not unobjectionable. He has now repeated his experiments, and he seems to have established his case. He fixed auxiliary walls more or less close to the outer walls of a room, heated the inside surface of the inner wall, and measured the temperature on the other face of that wall and of the air between the two walls. The partition walls were solid or hollow; they were heated by placing heated iron boxes against them, and the temperature of the other surface was determined with the aid of little pockets containing mercury and thermometers, and further of thermopiles. It resulted that the heat penetrated walls one or half a stone in thickness, whether they were solid or hollow, almost equally quick, while the propagation through hollow walls packed with sawdust and other insulating materials was much slower. The experiments continued for eleven hours. The propagation of the heat through the air was, of course, the work of radiation, and if the conditions were favorable for radiation, then insulation was not much good. Kieselguhr, slag wool, even peat and sawdust are much better than an air space, but the latter are too hygroscopis, and therefore unsuitable. Astfalck has rejected narrow air spaces because they favor sweating, which spoils the walls and woodwork, and makes them unhealthy. To keep your walls warm in winter, we may clothe them inside with cork, paper stuff, or kieselguhr, especially if the walls consist of hard burnt bricks or natural stones which are fair conductors of heat.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The Quebec Architects' Act came into operation on the 1st inst., on which date the period allowed for registration under the act expired. It is understood that upwards of one hundred applications have been received from persons desiring to register and thereby be authorized to use the title "Architect." The Council of the Province of Quebec Association of Architects have been busily engaged of late with these and other matters pertaining to the operation of the new law. Arrangements are also in progress for the annual meeting of the Association, the exact date for which has not yet been fixed but which is expected to take place towards the close of October. More detailed information with regard to these matters will be printed in our October number.

Mr. Wilmot Fitzsimons, of the Keith & Fitzsimons Company, Toronto, was recently married to Miss Clara Maud Deasse, of Port Rowan.

The medical officer of the Brantford, Ont., Board of Health in a recent report to the Board recommended that the owners of more than three hundred houses be required to connect same with the city sewerage system, sixty days being allowed for carrying out the order. The report was confirmed.

Shipments of plaster from the Cape Breton mines to Philadelphia have been on an extensive scale since the close of the Spanish-American war. This industry is an important one, and has been increasing for several years. The shipping facilities have been improved, and the company have now a locomotive in connection with the mine.

CHURCH ARCHITECTURE.*

The distinctive feature in the plan of mediaeval churches is the division of the building into a chancel crossing, transepts, nave and aisles. Whatever may have been the origin of the cruciform, this one thing is certain, that for all these peoples it signified the Cross which, except in the very earliest days, has always stood the foremost symbol of the Faith. The aisles signified the Trinity. Besides these more obvious symbolisms, the chancel represented the Church triumphant, the nave the Church militant, or the new and the old dispensation. The chancel was further divided into sanctuary and choir, the one for the celebration of the Holy Eucharist, the other for the due rendering of the service. The sanctuary was fitted with altar, credence, piscina and sedilia, and the choir, besides stalls for clergy and choir, had lecture and pulpit. Side aisles contained side chapels and chantries, for daily or special services, and in these latter and also in the chancel, or chancel aisles, there were tombs, some of which were in themselves objects of veneration, as the last resting-place of saints.

All of these things represented some distinct phase of faith—the altar, the real presence of the Lord's body—the choir, the need of orders and ritual—chantries, prayers for the repose of souls of those who had died in the Faith. In so far as these beliefs are represented by these forms to-day, just so far and no farther are they fit forms for us to use. To all Christian bodies the cross is still the great symbol and the cruciform is ecclesiastically admissable and architecturally a boon. To the great mass of Christians, the apostles' creed is the utterance of their faith, and to them an expression of this faith in three-fold nave and aisles is fit and right. The chancel, with all its appurtenances, altar, sanctuary, choir, stalls, desk, etc., unfortunately belongs only to those whose ritual required these things, but where they are absent there is at least no reason why the minister's platform should be fitted up like an hotel parlor. Such opportunity as there is for dignity and reverential treatment should certainly be seized. Side chapels in a church whose service is said daily to a comparatively small number are in place, and a most useful addition. Chantries are practically antiquated, for prayers for the dead, when used, are said in private by a priest paid for the purpose.

So much for the circumstances under which these forms may be rightly used—one word about the use of the form where the belief does not justify it. The architect who takes forms which have an ecclesiastical significance and origin, and uses them as artistic accessories where they have no significance, and where the faiths they mutely express are not believed in, is acting the part of a charlatan and playing upon the ignorance or carelessness of his clients. Even if his clients are willing to accept these things, it is an injustice to those to whom the forms belong in their entirety. Truth is the basis of architectural right and wrong. When mediaeval buildings used nave and aisles, chancel, sanctuary, Lady chapels and chantries, they represented vital forms of faith or served actual uses. Let us be equally true to-day, and embody in our churches only what those churches profess, provide not for mediaeval uses, now abandoned, but for modern needs.

Such, in the main, are the chief features of the old churches, which, as they answered needs similar to ours, may be fitly followed to-day. There are other needs which are the outcome of growth and the advance of civilization, with which they were not called upon to grapple, and which we must solve for ourselves.

First, to finish with isolated or country churches before touching on the city problem, we need more or less ample accommodation for the clergy, for the choir, for the childrens' school, for the gathering of the various lay bodies who help in the great church work. For all these the old buildings give practically no precedent. Occasionally a vestry, a sacristy or an aumbrie was attached to the chancel. Even these were largely removed in Reformation days. There is, however, one rather apt lesson which the English ecclesiastical architects did most clearly teach, and that is, that if a need exists, the simplest and most direct solution is generally best, and if a place for a priest to vest was needed, they put a room of the necessary size where it was most conveniently placed for use, and this done, they found its architectural treatment practically settled.

The modern plan which one sees so often followed is to take some hard and fast well balanced scheme and let the morning chapel balance the vestry, the porch balance a lavatory and the Baptistry balance the rooms for mothers' meetings. This sort of thing may work well for large classic buildings, and sometimes seems the essential note in such plans, where the regular balance of the parts, and the relation of parts to the whole, are necessary to the design; but with churches it is somewhat different, the width and length of chancel have never had any fixed relation, nor has any such existed between nave and aisles, and the meaning and use of the various parts of the building have been a gradual natural growth, responding to need and fulfilled by a skill which was steadily improving. Such a growth cannot be reduced to a system—such symmetry as exists is occult rather than obvious.

It may seem begging the question to thus pass over without comment churches built on classic lines, but I have for lack of time been obliged to confine myself to one country—the one from which I believe we can learn most—and notwithstanding Wren's prolific production of semi-classic work, I do not think that either Wren or his followers have left a lasting mark on ecclesiastical architecture. Not a church rises in England to-day on the line of his work, while hundreds are following the lines of thought so rudely interrupted by the troubles of the Reformation. Nor does it in any way follow that the bodies who date only from the Reformation should hold to the models of chapel and meeting houses which were erected by their ecclesiastical forefathers, for we see clearly enough now that these men in the overzeal of reformers, a zeal which we cannot but admire, overthrew much that was beautiful and lovely and of good repute, and which was fit to make the service of God more reverent and more worthy. The barren meeting houses, and despoiled and whitewashed churches are a warning, not a precedent.

When we turn from country to city churches we find ourselves confronted by wholly different problems. We have seen churches, built on the old plans, gradually surrounded by buildings which press in around them, crowd and overshadow them, until one must feel convinced that the solution has not been reached. Where in the country one can build low nave and aisles, and thus emphasize the height of spire and tower, of what use is this in a city where an office building, or even a

* Paper by Mr. R. Clipson Sturgis, Boston, read before the A. I. of A.

ten-story apartment, will throw the spire into the shade and make the nave seem but a hovel. Even where the church, long established, has grounds about it and is thus saved from absolute encroachment, it is fairly evident that the building is an anachronism.

The natural way in which the city church presents itself to my mind is that it must conform to a city lot, generally narrow and deep, and lighted on two ends only. With low naves and high towers and spires ruled out as already noted, we have still left our early distinguishing feature of length, and the question of lighting length with outside light is at once answered by adding aisles to nave and depending on a lofty clerestory. The necessity for the important clerestory naturally suggests that in length and heighth of nave we shall find the best solution of the city church. We have given up nothing of essential ecclesiastical precedent or character in the interior, and in the exterior we confine ourselves to a single fine facade (or perhaps two if the building runs from street to street).

This seems to me the most obvious way of meeting the requirements of a city building, and gives ample opportunity for beauty; a great west window with lofty rising lines may well seem to have the dignity and beauty of aspiring height, and yet not challenge comparison with even a twenty-story building.

For such buildings the continent, especially France and Belgium, furnish us the best precedent. French cathedrals and churches seem to one fresh from England immeasurably lofty and sublime; and the people of the Netherlands were fully alive to the value of narrow and lofty fenestration—often further emphasized by mullions so light as to seem scarce capable of sustaining their height.

A noted English architect once said to me, "If you have heighth, do all you can to emphasize it and make it tell, and if you have length let every line tell of length." This, to my mind, is the keynote in church building. If you have all the dimensions heroic like Amiens, well and good, but if you have opportunity for but one, make the most of that.

Finally, no notice of ecclesiastical architecture, however brief, would be justified in passing over without comment the work which has been done in the present century. In the early part of the century, church building was at its lowest ebb, hardly a building of any importance or merit was erected, but with the forties and fifties men began to inquire as to the wisdom of our forefathers in ruthlessly destroying or casting out what was beautiful. The church alone seemed to be separated from what was lovely. With the revival in England of the study of church doctrine came the revival of the study of church architecture. Cathedrals and parish churches were repaired and restored (sometimes we could almost wish these enthusiasts had not done this); engravings and measured drawings were published, a general interest awakened in the many arts which were crushed by the zealous reformers.

Out of these studies and enquiries came, in England and here, men who understood the old work and loved it—who loved what it meant, and who thus loving could put new life into it. Previous so-called Gothic revivals had been attempted with ghastly results, but with Pugin and Sedding the lost arts of the sixteenth century received new life, and now there are a number of vital designers in England, and not a few here, who have studied the old work with reverence and who can design and build in the spirit of the earlier days.

Do not run away with the idea that I am a mediævalist, I have no wish to return, even in thought, to days which were so far less full of opportunity than these, but I am fully persuaded that we in this country are so much accustomed to looking, to straining forward that we do not study sufficiently, and try to learn from what lies behind or even before us.

It is good sometimes to drop the rush and bustle of our hurrying life and just take at least a glance behind to assure ourselves that our progress is really forward, and that in our eagerness for novelty we are not wasting time in studying problems which have been solved and settled long ago.

A PECULIAR HOUSE.

The most peculiar house in the United Kingdom is said to be a small triangular building erected about 300 years ago at Rushton, in Northamptonshire, by Sir Thomas Tresham, a fervent Roman Catholic, who is supposed to have wished by his design to typify the Trinity.

The house is all threes, each of its three sides being exactly 33 feet 4 inches—that is, 33⅓ feet in length. There are three stories, each has three windows on each of the three sides, and each of the windows in two of the three stories is in the shape of a trefoil—the three-leaved shamrock. The panes of glass are all triangles, or three-sided. In each of the other windows there are twelve panes of glass, in three fours. There are three gables on each side rising from the eaves; and from the centre, where their roofs meet, rises a three-sided chimney, surmounted by a three-sided pyramid, terminating in a large trefoil. The smoke escapes from this chimney by three round holes on each of the three sides. On the top of each gable is a three-sided pyramid covered with a trefoil. The building is almost covered with inscriptions and carvings. Three Latin inscriptions, one on each of the three sides, have thirty-three letters in each. Three angels on each side bear shields. Over the door is a Latin inscription of three words, meaning "There are three that bear record." Inside the house each corner is cut off from each of the three main rooms, so that on each floor there are three three-sided apartments. The house is not inhabited.

PAPER-HANGING MACHINE.

Paper-hanging by machine is a German invention. The arrangement used is provided with a rod, upon which the roll of paper is placed. A paste receptacle with a brush arrangement is attached in such a manner that the paste is applied automatically on the back of the paper. The end of the wallpaper is fixed at the bottom of the wall, and the implement rises on the wall and only needs to be set by one workman. While the wallpaper unrolls, and, provided with paste, is held against the wall, an elastic roller follows on the outside, which presses it firmly to the wall. When the wallpaper has reached the top, the workman pulls a cord, whereby it is cut off from the remainder of the roll.

The annual meeting of the Hamilton Art School took place on the evening of the 15th inst., when the medals, prizes and certificates won during the year were distributed, and the officers for the ensuing year elected. An exhibit of the work of the pupils was made on the 16th and 17th inst., and was inspected by a large number of visitors.

THOUGHTS FOR ARCHITECTS.*

As architecture is pre-eminently a constructive art, construction should certainly be its foundation—the very last thing that would be thought of now, for the æsthetic architect would leave that to the builder and the engineer. It seems ludicrous not to insist on an architect who is to build having such knowledge of statics as to know the proper method of resisting the force of wind, of water and of earth, and the thrusts of arches, vaults and domes. Statics would give us, too, important lessons in æsthetics, for it gives us the proper proportions of each part of a building when we know the height, the weight to be carried, and the strength of the material to be used. When these particulars are known and provided for, we may roughly say that we have only to accentuate the important part by mouldings, or have them adorned by the sculptor to make it into architecture.

* * *

In my opinion we cannot do better than make students design in cast iron when they have succeeded in designing in the old world materials. It is too expensive a material to disregard its statical conditions. It is difficult to arrange a column or a stanchion so that its capital may securely carry a heavy superstructure with a large base. It is difficult to make the base of a thin column or stanchion wide enough to safely transmit the weight it bears on to a foundation of much softer material; there are difficulties in the design of mouldings and floral ornament that can be cast, and there are absolutely no examples to imitate, so that the knowledge, care, skill and invention of the student are called into play. We cannot believe that the ingenious mediæval architects would have foregone the use of such valuable and powerful materials as wrought iron, cast iron and steel on account of Mr. Ruskin's objection that they were not mentioned as building materials in the Bible.

* * *

I am rather surprised that architects do not see that degrees of excellence are possible in architecture, or, if they do see it, that they do not act on their convictions. The greatest living architects are contented with the same remuneration for their work as the apprentice just out of his time, and merely seek to get into a wholesale business. This greatly helps to degrade the profession in the eyes of the public, and gives a very wrong impression of the facts, as every architect well knows. Thousands of public monuments have been erected in Europe since the Golden Age of Greece, not to speak of important private buildings; yet the Parthenon and the Caryatid Temple on the Erectheion have never been equalled since, nor the interior of the Pantheon, nor the west front of Notre Dame at Paris, nor the Cornaro-Spinelli Palace, nor the Scuola di San Marco, nor the Town Hall of Brescia.

* * *

Recollect what an obtrusive art architecture is, and how strongly it forces itself on the attention; how long it lasts and how it forces people to come to see it in its own country. If you would only think that it is the history of the present power and cultivation of the people, you would at least learn enough about architecture to be able to judge of its excellence as you do about the other fine arts you love, and be as proud of its excellence and as delighted with it as you are with the pictures, statues, poetry, romances and musical compositions of the day; and when you do take the same interest in it you will certainly have your reward.

* Extracts from the address of Professor Aitchison, A.R.A. President, at the opening meeting of the R.I.B.A.

ILLUSTRATIONS.

PROPOSED RESIDENCE, BLOOR STREET, TORONTO. F. S. BAKER, A.R.I.B.A., ARCHITECT.

PASSENGER DEPOT, C. P. RAILWAY, VANCOUVER, B. C.—EDWARD MAXWELL, ARCHITECT.

OFFICE BUILDING FOR THE LONDON AND LANCASHIRE LIFE ASSURANCE COMPANY, MONTREAL.—EDWARD MAXWELL, ARCHITECT.

TRINITY COLLEGE SCHOOL, PORT HOPE.—DARLING & PEARSON, ARCHITECTS.

This school, which aims at providing a complete education for boys, was founded in 1865, and has achieved an excellent reputation. The building, which occupies a commanding site overlooking Lake Ontario, a mile distant from Port Hope, was rebuilt in 1895. It has been made as nearly as possible fire-proof, being divided into five sections by heavy fire walls, the only communication between these sections being on the line of the corridors. In addition the building is equipped with fire appliances for every floor.

The lighting, heating and ventilation of the class-rooms and dormitories has received the special attention of the architects. In connection with the system of ventilating and heating, a tunnel, ten feet wide and eight feet high, runs under the entire building. In this the fresh air is introduced and warmed before being conducted by ventilating shafts to the various rooms.

There are four stairways similar to the one shown in our illustrations, each running to the top of the building, and constructed throughout of stone and iron.

On the school premises, comprising upwards of twenty acres, are excellent cricket foot-ball and tennis grounds, and a skating rink; there is also a large covered gymnasium, and a play-room for use in bad weather.

The head master's house is situated in the school grounds, to the east of the main building.

According to a contemporary, in a recent house where a good deal of attention has been given to the ventilation there is a small ventilator in the ceiling and one in the base-board of each room. The latter is connected with a pipe which goes to the kitchen chimney. This method is considered a good one, because the heat of the chimney creates a continuous current, thus drawing out the stagnant air at the floor, and when the hot air register is open the ceiling one needs only to be slightly open to secure excellent ventilation.

A device that is being introduced into English schools and is of evident merit, says Architecture and Building, is heated hat and coat racks. It is made entirely of iron tubing, the horizontal bars supporting the hat and coat pegs, while the upright tubes are connected with a supply of hot air, which is allowed to circulate through the tubing. The advantages of this arrangement are very evident, both from the point of comfort and sanitation. Nothing can be worse than the damp, steamy condition of school cloak-rooms in wet weather, especially for young children, and in our modern steam heated schools this arrangement of hat and clothes' racks could be easily and inexpensively applied. When weather is fair and warm, the heat is not needed and would be cut off, but during the season of the year when most needed the heating plant of the building would be always in operation, ready to furnish the necessary heat

LEGAL.

A Canadian appeal case which recently came before the Judicial Committee of the Privy Council reveals that disputes can easily arise between partners, says the Builders' Reporter. In 1877 the late Simon Peters obtained a contract amounting to $529,296 for the construction of a dock in Quebec. An extra work of $18,393 was afterwards ordered. Mr. Peters entered into an arrangement with Messrs. Moore & Wright to do part of the work on the understanding that, while appearing as partners, each would be paid at contract price for whatever was done. Instalments were duly received, and when the dock was completed the harbor commissioners offered $52,011 as the balance. The amount was considered insufficient, and the courts afterwards awarded $87,468 as the amount due. The partners could not agree about the proportion in which the money should be divided, and $68,972 were lodged in the bank. Litigation began and in 1896 the court held that as the agreement between the parties was not definite, the section of the civil code should be applied which affirms that when the shares of partners are not fixed, they must be considered to be of equal amount. On appeal it was decided that Mr. Peters' representatives should be paid $27,667, the remainder becoming the property of Messrs. Moore & Wright, who were dissatisfied with the arrangement, and appealed to the Judicial Committee of the Privy Council. The decision was given against the appellants on most of the points raised, and they were ordered to pay three-fourths of the costs. The result is another instance of the risks which are incurred by indefiniteness in the language of deeds, for in this case it was evidently intended that neither party in the partnership should earn a dollar through the labors of the other.

PERSONAL.

The death is reported of Mr. Alexander McKinnon, a prominent contractor at Picton, Ont.

Mr. William Cooper, a well known contractor, of Clinton, Ont., was killed by falling from a scaffold on August 17th.

Mr. Thos. A. Harvey, late of London, Ont., has recently graduated in civil engineering at Rennsselaer Polytechnic Institute, Troy, N.Y., has secured a position with the Pennsylvania Steel Co., of Harrisburg, Pa.

Mr. R. W. G. Bousfield has recently opened an office for the practice of architecture in the Spectator building, Hamilton, Ont. Mr. Bousfield is well known in the profession, having while a resident in Toronto taken an active part in the affairs of the Ontario Association of Architects. We trust that he may meet with success.

Mr. G. H. Fellowes Pyrne, who was recently elected president of the London Architectural Association, was in the early '70's a draughtsman in the office of Mr. R. C. Windeyer, architect, at Toronto, Ont. In 1875 he returned to England and entered the office of the late Mr. G. E. Street, R.A., subsequently working with Mr. Swinfen Harris, the late Mr. R. J. Withers, and Mr. A. Waterhouse, R. A. He commenced practice in London in 1880, and has since designed many churches, schools and vicarages.

It is reported that a company is in process of formation at Alvinston, Ont., to manufacture vitrified bricks.

The new city directory of Montreal, recently published, gives the number of contractors as 560; carpenters and joiners, 90; plumbers and gas fitters, 160; painters, 90. The total population, inclusive of the suburbs, is 325,000.

The Dominion Government has expropriated the quarry belonging to Mr. Archibald Stewart, late contractor for sections 1 and 2 of the Soulanges canal. The stone is required for use in the completion of the canal by the present contractors, Messrs. Ryan & McDonnell.

In enclosing his subscription to the ARCHITECT AND BUILDER, Mr. Geo. Scholield, of Fairview, B. C., writes: "I like your paper more and more, it is getting more beneficial and interesting all the time. I pass it over to the men and many valuable hints have they taken from it."

The assets of the Moir Granite Co., of Stanstead, Que., were recently purchased at auction for a nominal sum by the Eastern Townships Bank. The stockholders, having lost what money they had invested, refused to redeem the property. The sale will in no way interrupt the operation of the quarries, which has for some time been conducted by Mr. David Moir upon a royalty.

MANUFACTURES AND MATERIALS

WINNIPEG CLAY.

THOSE who have visited Winnipeg in the spring or autumn know something of the adhesive qualities of the clay in that locality. Until the present soft mud bricks of a light cream color are the only product of the local brick yards, but it is believed by some that clay adapted to make a better class of building brick exists at no great distance from the city. An American journal suggests that an opening exists for paving brick and sewer pipe manufactories, but does not indicate where the raw material is to come from. It is a well-known fact to those acquainted with the subject that the manufacturers of these materials in the eastern provinces had many and serious obstacles to overcome before they attained to the degree of perfection which has now been achieved. The difficulty of obtaining raw material embodying the exact constituents necessary to give to the manufactured product the durability and finish required, has been found to be one of the greatest obstacles to be overcome. The manufacturing apparatus to be employed, and the successful manipulation of the material so as to secure uniformly satisfactory results have only been determined as the result of long years of arduous experiment. In view therefore of the apparent lack of suitable raw material, and the limited local demand, it does not seem to us that our contemporary's advice in this matter could be profitably acted upon at the present time.

A NEW ARTIFICIAL STONE.

A SCOTCH firm is manufacturing an artificial stone which is said to stand every test, and to be impervious to all vagaries of the weather. The process is a simple one, and the ingredients of the stone, chiefly lime and sand, are not expensive commodities, so that it is believed that the artificial product will be able to compete with the real. The lime and sand having been thoroughly incorporated, are passed into moulding boxes, which may be of any convenient size or shape, and these are placed within the converter. Water at high pressure, and having a high temperature, is then pumped into the converter to cause the necessary chemical union between the lime and sand, and the moulding boxes are also submitted to a temperature of about 400 degrees Fahrenheit by the action of superheated steam. In about thirty hours the surplus water is run off, but the heat is continued, in order to remove moisture from the moulding boxes, for another fifteen hours. The boxes are then removed from the converter, and the stone within them is practically ready for use. Experiments are now in progress from which it is hoped that other products of nature's laboratory, such as slate and marble, will presently be successfully imitated.

Mr. C. B. Stowe, referring to the grinding of Portland cement at a recent meeting of the Civil Engineers' Club of Cleveland, said he found, in testing some foreign cements, that about 60 per cent. would pass through a 200-mesh sieve, and about 80 per cent. through one of 100 meshes. He had made some tests recently to ascertain the point of fineness at which cement ceases to be cement and becomes practically sand, and found it to lie between the 200 and 400-mesh sizes. It was also found that much depends upon the mixture of materials before burning, the strength being about in proportion to the amount of mixing where the fineness is 200. He had some clinkers from which a sand test would go higher than a neat one, and had found that a cement might be so fine that it will crystallize in a neat test in such a way as not to carry the strength.

STUDENTS' DEPARTMENT.

C. A. & B. STUDENTS' COMPETITION.

THE publisher of the CANADIAN ARCHITECT AND BUILDER invites architectural students to submit drawings in competition for designs for four ornamental chimneys, for which first, second and third prizes of $15, $5 and one year's subscription to the ARCHITECT AND BUILDER, respectively, are offered.

The chimneys may be of brick, stone or terra cotta, or any or all of these combined.

Competitors are required to show by plans, perspective sketches and details, with or without elevations, the chimneys and sufficient of the plan and arrangement of building to explain the reason for form and position adopted, and to show roofing and other adjacent features it affecting the treatment of the chimneys.

Drawings must be made with pen and perfectly black ink ONLY, on white drawing paper, bristol, or tracing linen, to the size of 15 × 21 inches, and must be so drawn as to give their proper effect when reduced to one-half this size. No brush or color work is permitted.

The competition will close at 5 o'clock p.m. on Thursday, December 1st, 1898. No consideration will be given to drawings which may be received subsequent to that date and hour.

Drawings should be sent by mail or express, addressed to the editor of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto, and marked on the outside "C. A. & B. Competition." All postage and express charges are to be paid by the competitors. Each drawing should be marked only with the non de plume of the author, and should be accompanied by a sealed envelope marked with the same non de plume and enclosing the full name and address of the competitor. This envelope will remain sealed until the competition is decided.

The merits of the designs which may be submitted in this competition will be decided by a joint committee, composed of officers of the Ontario Association of Architects and the Province of Quebec Association of Architects, whose decision will be final.

The right is reserved to withold one or all of the prizes if, in the opinion of the judges, the designs submitted should be so inferior as to warrant such a proceeding.

Students are requested to read carefully the above conditions, absolute compliance with which will be required of each competitor.

ADDRESS TO STUDENTS.*

ARCHITECTURE is a structural art; and therefore the art of construction is the most necessary thing to be known. The science of construction is statics; consequently the elements of statics must be known. A knowledge of statics, too, gives us a true ratio between every part of the structure, and it gives the real shape that each part must take; if we were as clever as Nature, it would in all probability give us a beautiful shape. Unfortunately, we are far from being so clever, and consequently we have to learn by other means how a beautiful shape can be made out of the necessary shape. For this purpose we must study deceased architecture and Nature. Every piece of deceased architecture that we admire can be made to show us the æsthetic laws that govern it and produce its excellence, and these laws are as capable of being employed now as then. Every important portion of an ancient building may have the reason extorted from it as to why it pleased at its creation, and pleases us now; but from our greater knowledge, and from the necessity of using other materials, we may see that the proportions then used are not now applicable; for instance, a Greek Doric column showed the statical knowledge of its day, but it certainly does not now. Our materials and climate are different, and the æsthetic sentiment of our day is probably different too; so we must get some of our hints and solutions from Nature's works. There are in the first place human beings and animals, and there are thousands of different sorts of trees, of leaves, of grasses, of buds and fruits, which have beauty in different degrees, and we should learn from these how the beauty we want can be attained by various shapes and various proportions.

Without the gifts of the mathematical and the artistic capacities no man should become an architect; but there is another requirement which we call planning that is, how to make each room, hall, passage, and staircase answer its purpose, and how to pack them in the most convenient way. This may be called common planning; but there is artistic planning as well, which is the choice of forms which are not only appropriate for use but are agreeable to the eye. I would by no means discourage any one who loves architecture and will study it from being an architect, for there are various degrees of power and excellence in architectural works, all of which make up the realm of architecture. We do not despise the violet because it is not so grand or so lasting as the oak.

The smallest cottage, if perfectly arranged, perfectly constructed, and perfectly proportioned, may be as delightful to contemplate as the mansion, the palace, the town hall, or the cathedral, though it does not require the same knowledge, the same daring, the same invention. You must bear in mind that nothing great is reached in the fine arts without simplicity, but lovely simplicity is reached by great labor, and takes about ten times as long to arrive at as ornateness. "Oh! what a power has white simplicity!" Just now there is a great inclination to get effects by exaggeration, or by ways that involve little thought or trouble, such as by the distortion of the orders, the sticking on of bits of rustication all over a building, or by putting water-gates into the attics of buildings.

We must not forget the proverb that "the human mind is greedy of novelty," so much deplored by William Morris and by Mr. Ruskin, though the desire for novelty is natural to man, and cannot be overlooked or overcome; for each generation has not the same knowledge nor desires as the preceding one. In eating, the most delicious food soon palls, hence the proverb of "Nothing but eel-pie." Let us, instead of deploring the taste for novelty, echo Tennyson's words: "Let the great world spin for ever down the ringing grooves of change." True novelty is obtained by development. We see how Nature develops her types; and if we had lived in the palmy days of Greece, we should have seen how the young clodhopper was developed into grace and beauty by training.

It is rather nauseous and rather ridiculous to hear so much talked of a new style, particularly when it is supposed that a clever man can invent it. The real new style is to be attained by the improvements that come about by the altering of proportions through our greater knowledge of statics and the strength of materials; by making our buildings perfectly suitable to the new requirements of our age; by the suiting of our mouldings to the climate, by the greater cultivation of outline, and by a deeper knowledge of our own light and shade.

* Extracted from an address by Prof. Aitchison, R.A., President R.I.B.A., and reprinted from the Journal of the Institute.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Some Constructional Features.

In the building of sheds or temporary buildings for agricultural fairs or for other specific purposes, the country contractor is often called upon to display a constructional ability that taxes his resources to the utmost. For a temporary shed, suitable for exhibition purposes, for stabling or for the display of farm products, the design shown at Fig. 1 might be adopted, as the constructional features are simple, and it may be built altogether of planks, ninety per cent. of which may be employed for other purposes after having served in the building, if not required to remain. The posts might be made of 2" × 10" stuff, girts 2" × 8", roof-timbers of 2" × 6", braces 2" × 4", cut flat footed, and the whole either spiked together with heavy spikes or bolted together with 5/8" carriage bolts. The latter would be the better and the cheaper in the end, as less lumber would be destroyed, and the bolts would not be in the least impaired. The bays, B B B B, might be devoted to cattle or poultry, and the centre bay, A, could be used for exhibiting roots, fruits or other similar products. No other foundation than 3" x 12" plank blocks resting under each post would be required, and the outside wall, O, might be formed of 2' x 4" scantling, and boarded with planed or rough lumber. The roof would answer very well if covered with sound one inch boards, doubled, and laid with their lengths running parallel with the incline of the roof, and well lapped over at the top joints. Fig. 2 shows another style of shed, suited to a position where the ground dips. In this case, A and B would make the exhibition flat for farm products, while the lower bay, C, would answer for live stock. The method of construction may be the same as the previous design. Fig. 3 exhibits a more complicated design, but one possessing the same constructional features as the previous examples. The braces are formed of planks, single and double, and the posts may be either round unwrought timber, or square, or formed of planks in one or two thicknesses. The whole is bolted together with suitable carriage bolts, which makes the structure strong and firm.

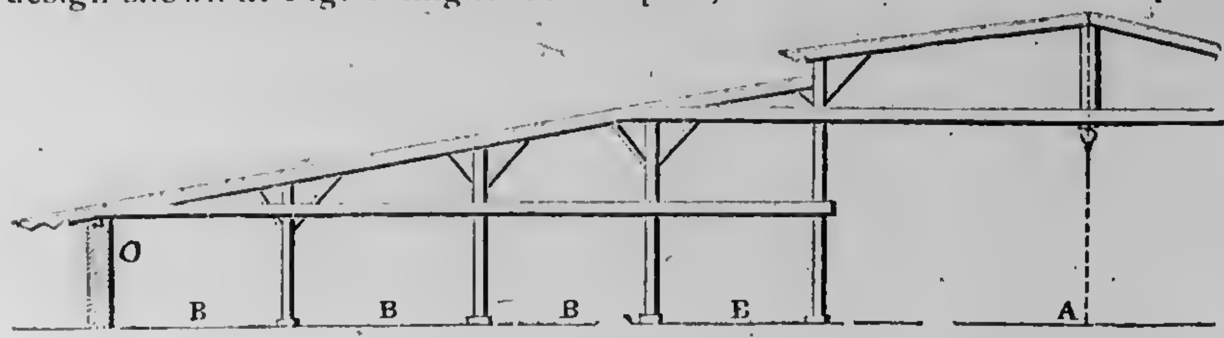


Fig. 1.

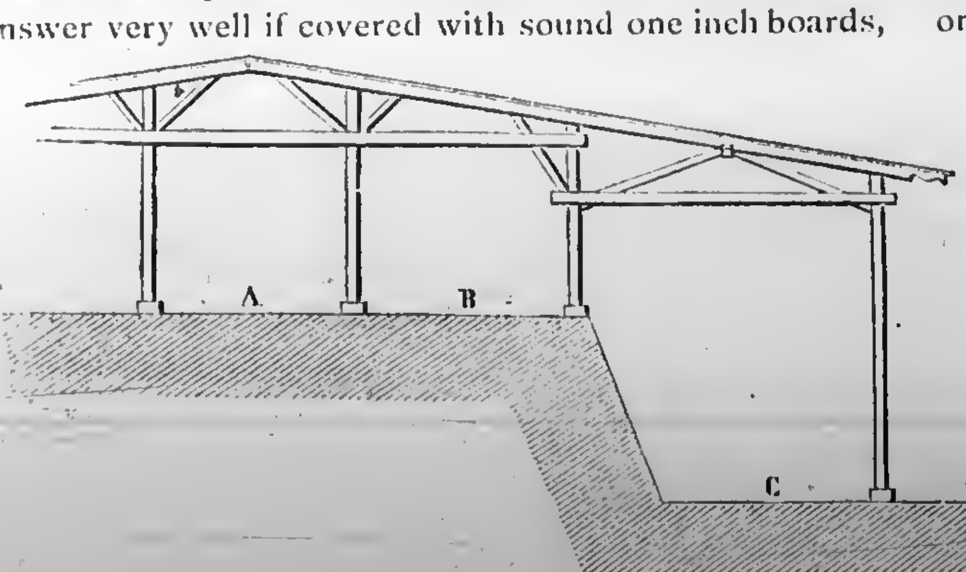


Fig. 2.

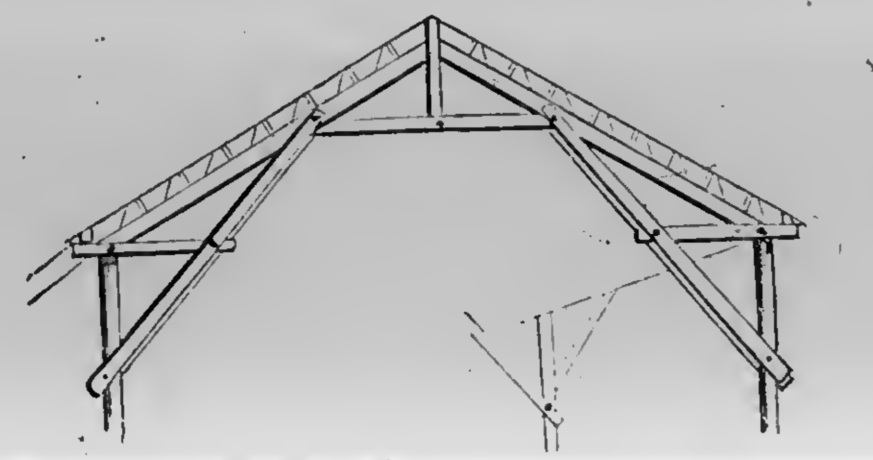


Fig. 3.

Round Timber Construction.

When round and straight timber is plentiful, it may sometimes be deemed necessary to erect sheds and other outbuildings with frames of timber the most available. In order to meet this condition we offer a few designs in which round timber forms the structural base. Fig. 4 is designed merely as a sun and rain shed, with feed boxes against each supporting post. The central posts or uprights are let into the ground and have their ends resting on a log, as shown by the dotted lines, and the ends are either tenoned or spiked into this log, and braces are then run up from the log to a point just above the ground line, and are secured firmly to both log and post. The cross timber is scarfed into the post at O, and is well fastened with bolts or other sufficient device. The main braces are cut flat footed at X X, and fit on a prepared surface made on the cross timber, and the junction is well secured. The lower ends of the braces may be bolted to the upright post, or they may be tenoned or secured by any other method. The ridge pole and plates are shown, and the rafters may be of round balsam poles covered with rough sheeting boards, and shingled. Fig. 5 shows an end bent of a building formed with round timbers; a a show the portion for stalls, and if used for a barn or other similar purpose, the opening, b, may answer for a threshing-floor, while the loft, c, and the spandrils may be made to serve the purpose of a hay or grain loft. The methods of construction are quite apparent, the long braces being lashed to the central posts and cross girts. While this diagram is supposed to represent a combined barn and stable, it may be made to answer many other purposes. Fig. 6 shows a larger building, and is intended for a driving shed, suited for a country tavern, or even for a country church, where farmers drive some distance to reach the place of worship, and where accommodation for teams is imperative. The centre post, a a, b b, shows the dividing line, and may be boarded up to the ridge, or only part of the way. The spaces, u u, are left large enough to accommodate horses and buggy. The lofts, c c, are intended for hay if the shed is in connection with a tavern; if in connection with a church, the lofts will require no flooring on the girts. Fig. 7 exhibits a structure that is very strong, and rather odd in shape. It may be divided into three stories, a, a, b, if desired. The posts, c, c, are let into the ground four feet, and the other timbers are framed, bolted or lashed to them. The structure should be lighted and entered from the ends. A building of this sort makes an unique and pleasant summer house, and it may be used for many purposes.

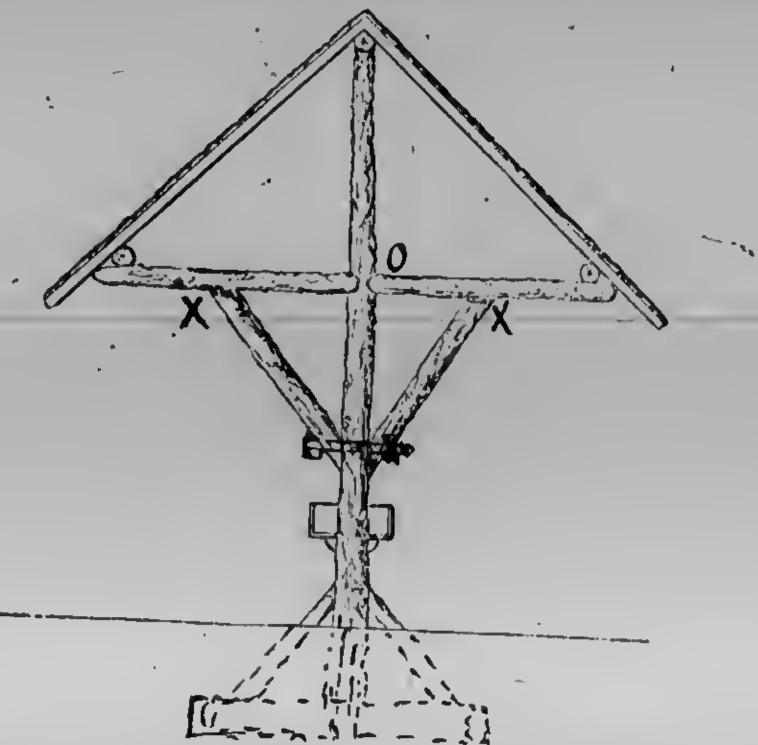


Fig. 4.

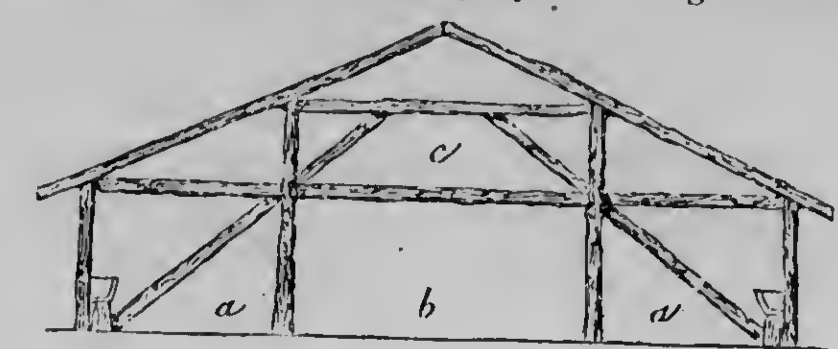


Fig. 5.

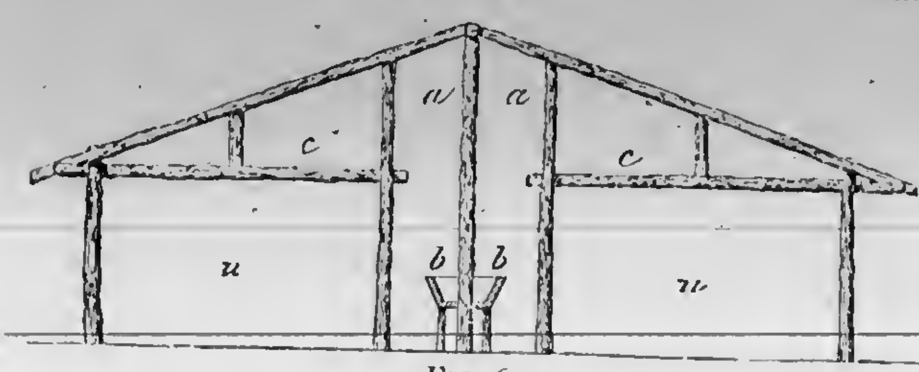


Fig. 6.

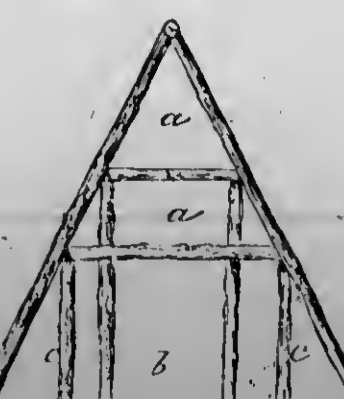


Fig. 7.

Dormer Windows.

We present herewith a design for a dormer window, which possesses the twofold quality of quaintness and economy. The windows are composed of two sashes, each containing 20 lights, of 10 x 12 glass. The sashes are hung and fit snugly in their frames, and are held closed by small shot-bolts top and bottom. Fig. 8 shows front elevation and plan, with details of mullion and jambs. The finish is quite plain, there being neither rolls on the angles or mouldings on the cornice. The gable is finished, and the finishing shingles on each course are rounded on their butts, which gives the work a good appearance. The angle occasioned by the sashes facing in different directions give a piquancy to the whole work that is very pleasing. The angle formed under the sill, at its junction with the roof, may be sided or shingled, the latter preferred the horizontal lines being made to confirm with the same lines as the roof. Fig. 9 shows the side elevation of dormer with the line of roof. It will be observed that the roof of the dormer continues beyond the face of the mullion making the gable over the sashes parallel with the wall plate; this necessitates a deep soffit over the sashes, which may be ceiled with matched and beaded stuff. In

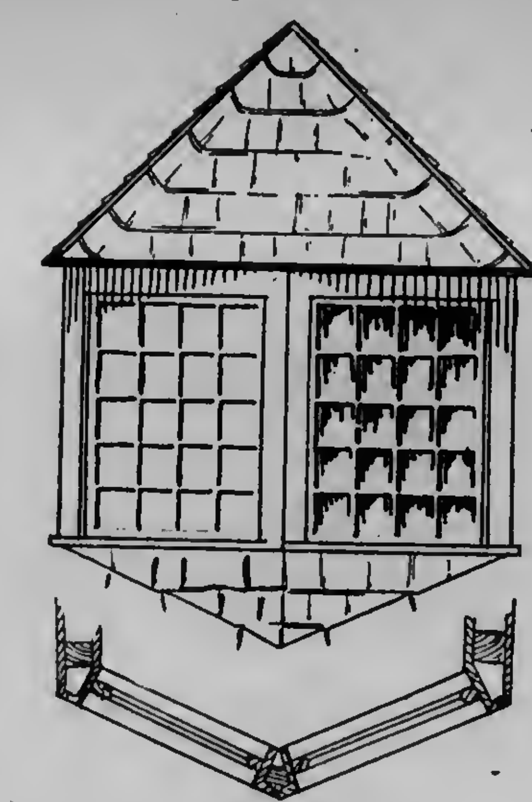


Fig. 8.—Dormer Window, Front Elevation.

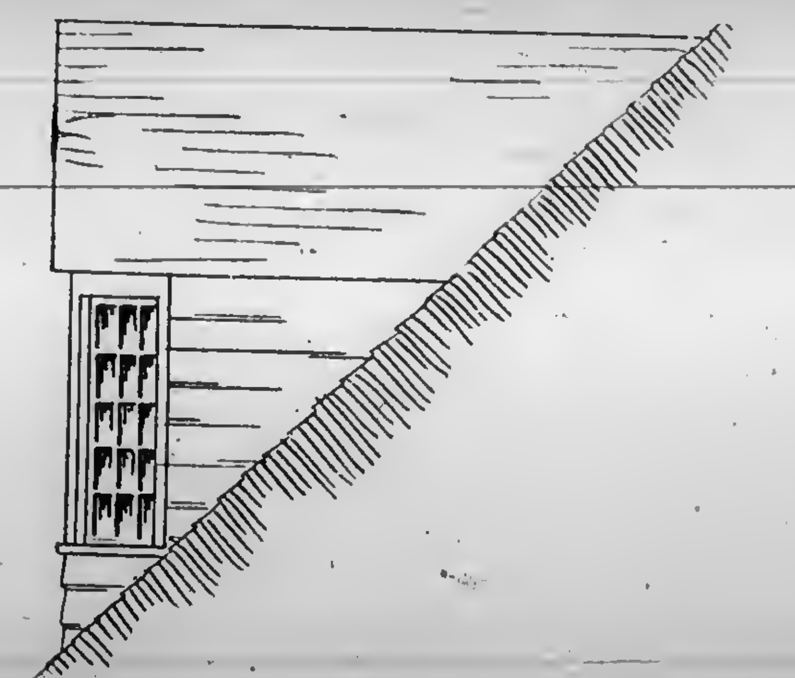


Fig. 9.—Side Elevation—Dormer Window.

preparing a roof for dormer windows it is always best to have the rafters set so that the frame of the dormer may set directly over them, and if the dormer is a wide one fill in the space between the bearing rafters with a sufficient number of rafters to make the work secure; then cut out such as are in the way and spike trimmers to the cut ends, and have trimmers fitted in snugly between the bearing rafters, to which they must be securely fastened. If the opening is more than ordinarily large the bearing rafters should be heavier than the common rafter, or they might be formed of two rafters spiked together. This precaution may prevent the roof from sagging, a fault that frequently occurs in roofs bearing large dormers when preventative measures have not been adopted. Sometimes the workmen will put on thin rafters the usual distances apart, shut the roof and lay out their dormers on the roof boards and then cut out the openings. This method is objectionable, inasmuch as the rafters are not often found to be in the proper place, and other rafters must be cut in between the ridge and plate or trimmers are cut in between rafters too wide apart, and then short rafters framed in between the trimmers to form the wall, a method that throws a goodly portion of the weight of the roof and the whole of the dormer on the two outlying rafters, a condition which is sure to end in causing the roof to sag to a greater or lesser extent, which may cause the dormer roof to leak at its junction with the main roof and prevent the sashes from working freely.

Splayed Work. Few things provoke the village carpenter and builder more than work that is to be built with a splay, be it door, window or hopper, and the diagram shown at Fig. 10

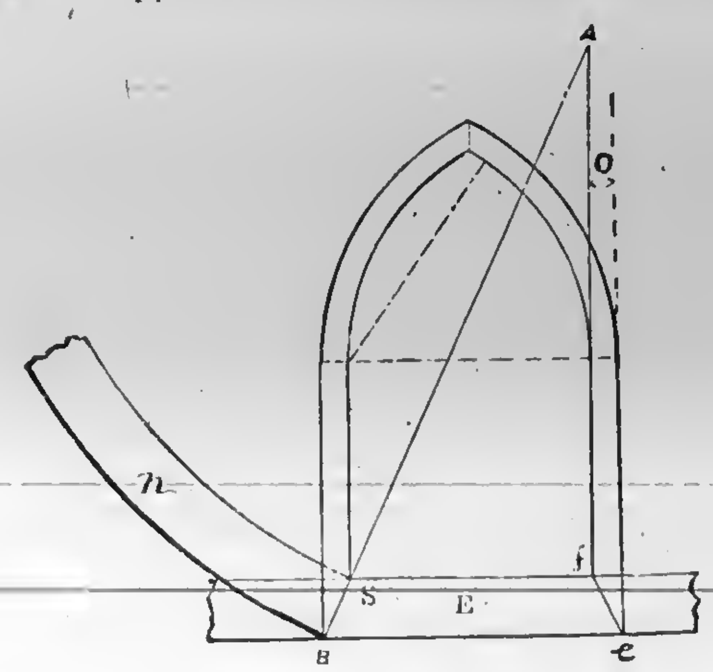


Fig. 10. Splayed Jambs and Head.

is presented in order to aid in the solution of one phase of splayed work. Let us suppose it is necessary to build a gothic window or door having splayed jambs or head, and it is desirable to make a veneer that will bend around the head and be of the proper shape. Let E be the side and f e the splay. A f shows the line of the inside jamb, O the difference between front and back edge of jamb, B A the line of splay. At the point of junction of the lines B A and a, set one point of the compass, and with the radius A B draw the outside curve of n, then with the radius A S draw the inside curve, and n will be the shape of the veneer required. The curve will answer either side of the bead.

The wages of bricklayers in Vancouver early in the present season were increased to $4 per day, or within a fraction of 45 cents per hour.

A GOOD IDEA.

The Boston Master Builders' Association have recently opened a bureau where workmen seeking employment may register their names, and where employers may find required help. The idea is one which should result to the mutual advantage of employers and employees, and tend to induce a feeling of greater friendliness between these classes, whose interests after all are so largely identical. The Builders' Exchanges of Montreal, Toronto and London should follow the example of the Boston Association in this matter.

PLUMBING IN VANCOUVER, B.C.

As a result of representations made recently to the City Council of Vancouver by the Master Plumbers' Association of that city, it has been decided to strictly enforce in future the local plumbing by-law, which requires that all plumbers shall pass an examination and take out a license. The city engineer and health inspector will conduct the examinations.

PLUMBING IN HALIFAX.

Some amendments have recently been made by the governor-in-council to the regulations governing plumbing work in the city of Halifax. A board of plumbing examiners is substituted for the city engineer. It is provided that "In buildings of not more than four storeys, 5 inch iron pipe weighing 12 lb. per foot, and 6 inch iron pipe weighing 15 lb. per foot, may be used above the cellar floor." Journeymen plumbers will in future be required to pass a qualifying examination set by the Board of Plumbing Examiners, and be able to show a certificate of competency. This certificate may also be granted to any master or journeyman plumber who shall furnish satisfactory evidence that he has practiced as such in Halifax for four years previous to the passing of the new rules and regulations.

EXPERIMENTS UPON VENTILATING FANS.

The three following recommendations are the outcome of a second series of experiments upon ventilating fans recently conducted by Mr. W. G. Walker, of London, Eng.: First, the velocity of the air passing through a fan should be as slow as practicable. Second, the diameter of the fan should be as large as practicable. Third, the pressure of the air passing through the fan should be as small as practicable. The great feature of propeller ventilating fans is that they may be made to comply with these conditions as nearly as possible. This kind of fan is essentially a ventilator, and its principal object is to move a large volume of air at a slow velocity and at atmospheric pressure.

In order to show the great effect of the area of the fan and the velocity of the air passing through it, the horse power has been calculated as follows for driving five fans, ranging from 2 feet to 4 feet in diameter, and each propelling 6,000 cubic feet of air per minute:

Diameter Feet.	Horse Power.	Velocity of Air Feet per min.
2	0.72	1,910
2½	0.29	1,224
3	0.14	848
3½	0.071	623
4	0.045	477

Here it is seen that the largest fan would require only 6¼ per cent. of the horse power required by the smallest for propelling the same volume of air.

The International Bridge at Cornwall, Ont., showing the Portion which Failed on September 6th, 1898.

View of the Cornwall Bridge Disaster.

THE CORNWALL BRIDGE DISASTER.

The accompanying illustrations show the character of the international bridge at Cornwall, two spans and one pier of which suddenly failed on the 6th inst., resulting in the death of fourteen workmen and injury to many others. The pier successfully resisted during last winter the current and ice shoves, and the false work was being removed from the superstructure when the accident occurred, so that the whole structure appears to have been practically completed, though not taken off the contractors' hands.

Several theories are advanced regarding to the cause of the failure, but we prefer not to speculate on this important feature of the case, but to await the result of the investigation which is now being made by Mr. Schrieber, by direction of the government. The contractors for the masonry were the well-known firm of Sooysmith & Co., of New York, who have had an extensive experience in this kind of work. The Phoenix Bridge Company, of Phoenixville, Pa., are the contractors for the iron work.

BUILDERS' ACCOUNTS.*

By A. O. Kittredge, F. I. A.

The object of all accounting may be described as twofold: First, to keep track of what is owing to us and what we owe to others; and, second, to show just where we are making or losing in our operations. The usual conception of bookkeeping limits it to the first of these two functions. The second, which is the real result, has been very generally supplied in the past by comparing the condition of the business man's affairs at two different periods, as, for example, January 1 and December 31 of a given year.

For illustration, the case may be stated somewhat as follows: If at the beginning of the business period, or January 1, our balance sheet shows us to be worth $10,000, and if at the end of the period, or December 31, a similar balance sheet shows us to be worth $12,500, then it must be that during the year we have made $2,500. This is very satisfactory in a way, and is seldom objected to as a method so long as a gain is shown by these periodical comparisons. But as soon as the comparisons between the two balance sheets show that there has been a loss the case becomes different. We then demand to know where the loss has been made, although we were apparently indifferent where we made the gain while our business was profitable.

Unfortunately the question where the loss occurred is not readily answered by books as ordinarily kept. Therefore a reexamination of the transactions of the whole year must be instituted in order to discover the real reason of the lack of profit or to single out the particular operation upon which the loss was made. Before we have discovered by this tedious operation what we are searching for, the thought no doubt occurs, that if we had only known, during the months that have transpired since our last balance sheet, that we were passing over dangerous ground, we could have saved at least a portion of the loss. Therefore our desire is to have our books so arranged for the future that we shall know at all times whether we are making or losing, and further that we shall know at the close of every operation just how much has been made or lost upon that transaction alone.

Dr. ANY CONTRACT.	Cr.
Labor. Materials. All specific outlays. Pro rata of general expenses.	Corrections. Materials left over.
Dr. Balance—Net cost. To be closed into Selling Account.	

So much by way of introducing to the reader's mind the thought that the business man of the period, whether he be a builder or engaged in some other branch of trade or industry, is not satisfactorily served by anything in the way of bookkeeping and accounting that falls short of affording him at all times a statement of his exact position and the rate of progress that he is making forward or backward. This brings us face to face with the need of accurate and properly arranged cost records. The builder's cost records should be so designed that a proper comparison shall ever be presented, not only in gross, but also in detail, between what it really costs to execute the work upon which he is engaged and what he obtains for it. Assuming that the selling price is the same as the estimated price, then properly arranged records of what it costs to execute a piece of work become actual verifications or corrections of the system of estimates and the prices that are made. Whoever estimates upon building work should be in such close touch with the records of actual cost that he is thereby informed of just what each given part is worth.

Dr. SELLING ACCOUNT.	Cr.
Net cost of each of the contracts.	Selling price of the same contracts.
Dr. Balance—Loss on the operations.	Cr. Balance—Gain from the operations.

* Reprinted from The Bulletin.

One object to be served by these articles, as I apprehend the case, is to point out the changes necessary to be made in bookkeeping as it is ordinarily understood and practiced by such bookkeepers as are available to builders to hire, and such bookkeeping as is taught in the schools and explained in the text books as will adapt it to the builder's actual requirements. These changes are not in principles at all. They are only in new applications of universally recognized principles. A few moments' attention to the Merchandise Account will not be out of place, since in what it represents is involved the whole question.

Dr. GENERAL EXPENSES.	Cr.
Costs of office rent, general superintendent, clerks, and all other expenses that cannot be specifically charged.	Amounts prorated to the several contracts.
Dr. Balance—Amounts not prorated.	Cr. Balance—Excess of actual cost that has been charged to contracts.

This account should balance at the end of the year.

In the majority of cases builders fail to see their costs in proper relationship to their selling prices, simply because the so-called Merchandise Account is made the general dumping ground for everything that is done. It is an overworked account. Materials, labor, expenses, and all costs whatsoever are charged on the one side, while the selling prices form the amounts on the other side. The common argument is that all the costs by being grouped together on the one hand and all the credits of sales being grouped together on the other, the difference between the two amounts, taking into account, of course, any materials remaining on hand or work in progress which has not been charged up, will be the profit or loss made on the operations. This is all very true, but it does not present the facts in the best shape to serve the builder's purpose. What he wants to know is the result of each operation. Did he make or lose on it, and how much? Instead of learning at the end of the year that he has made a small profit on the aggregate of his business, or perhaps even made a loss, when he feels morally certain that on some contracts he made a very large profit, he wants to know, for example, that on the public school building recently completed he made $6,000, and on the street-car barns he lost $8,000, on the row of dwellings in the suburbs he was able to make $6,000, on the church he came out even, and on the factory building he lost $4,000. In this statement the gains, it will be seen, are wiped out by the losses. A general showing, therefore, would indicate nothing save that the business was without profit.

Dr. MATERIALS ACCOUNT.	Cr.
All purchases of materials that cannot be specifically charged to contracts. Amounts returned from contracts.	Amounts delivered to contracts (taken at cost).
Dr. Balance—Cost value of materials on hand.	

The stumbling-block in the Merchandise Account, whether we look at it from the standpoint of the builder's bookkeeping or the bookkeeping of any other branch of business, is that it is made up with two sets of values. First, there are costs such as labor, materials, and expenses in general on the one side, and selling prices of these same elements combined on the other, the latter of course including whatever profit is being made. It is practically impossible to have all the materials consumed. There is always more or less of materials left on hand to be inventoried at the time the account is made up. Accordingly, the balance in this account never shows either the profit made or the loss sustained, as the case may be, nor yet the net amount of materials on hand. Instead, the balance is a combination of these two items.

Without extending this argument any further the reader will readily perceive the point that is in mind by comparing the Merchandise Account which, as stated, involves two sets of values with some other account wherein only one set of values is employed, as, for example the Cash Account. Values being the same on both sides of the Cash Account, the balance must represent the amount of money on hand. But suppose, for purposes of comparison, that the values on one side of the Cash Account were represented by various issues of a depreciated currency, worth all the way from sixty-five cents to ninety cents on the dollar, and that the values on the other side were gold, or, in other words, at par: required, in the light of the balance shown between the two sides of the account, the value of the currency on hand. This may be regarded as a ridiculous illustration, and yet it is no more ridiculous than the way in which the Merchandise Account is ordinarily made up.

With two sets of values in use in our transactions, a very rational proposition is to divide the Merchandise Account into two parts, so that each part of the account shall have its own set of values. Let one part be called "Buying Account" and the other "Selling Account." The Buying Account is made up of cost values or articles taken at cost prices, while the Selling Account takes the same articles at selling prices. The Buying Account is charged with all costs, such as materials, labor and expenses. In turn, as the jobs are finished up, it is credited with what they have actually cost. Then the balance in this account at all times will represent the materials remaining on hand or work in progress taken at cost prices. At the time that we credit this Buying Account with the cost of a job we debit the Selling Account with the same cost. In turn we credit Selling Account with the price we get for the job. Then the balance in Selling Account will always represent our profit or loss, as the case may be.

This fairly illustrates the theory that is at the bottom of the recommendations with respect to builders' accounts which follow. The two parts of the Merchandise Account here described may be called on the builder's books Buying Account and Selling Account as above mentioned, or other names may be given to the two parts, if other names are preferred. The first might be called "Building Account" or "Contract Account" or "Costs of Operation." Either of these terms perhaps better expresses the idea that is in mind than Buying Account, which name is more appropriate in a mercantile business, and yet it represents just what the builder buys, namely, materials, labor, etc.

The second account might be called "Results of Operations." But inasmuch as the first represents costs, called by whatever name it may be, and the second represents the sales of the articles produced by those costs, perhaps Selling Account for the second is as good a name as could be found for it, irrespective of the style of the term that may be applied to the first. However, the names that are employed for these accounts do not make the slightest difference. It is the distinction between them that is vital.

In what has preceded we have treated the Buying Account, as we will continue to call it, as though a single account was to include the cost of all operations. Our argument has been that we should know what each particular operation produces, and therefore there is the necessity of opening up a cost account or buying account with each operation. We should debit the schoolhouse, for example, with everything that goes into it, taken at cost price, including both labor and materials, expert service and special expenses, and, further, it should be debited with its pro rata share of our general expenses, such as office rent, salaries of general superintendent, draftsman, estimator, bookkeeper, and all other items of a similar nature which require to be spread over the entire amount of business we transact.

The plan, therefore that is recommended for use is indicated in the accompanying formulæ, and in general terms may be put as follows: Open an account with each and every contract, job, or piece of work. Debit it with all costs of labor, materials, and expenses that belong to it, and in addition with its pro rata of general expenses. When the contract is finished close this account (costs) into the general selling account. Selling Account receiving all the costs of work on the debit side, and the contract prices on the credit side, will then show by its balance the loss or gain of the business as a whole. Knowing by the plan the cost of each job we execute, and having before us the contract price, we can at once determine our profit (or loss) on any piece of work that we may desire to inquire into.

It is impossible in an article of this kind, if held to reasonable dimensions, to explain every detail, or to provide answers to all the questions which the builder's bookkeeper will be prompted to ask. A few words, however, about the prorating of general expenses, and the management of those materials which the builder buys in quantities and portions out to the different jobs and contracts as necessary. I will limit myself for the present to these alone, proposing to explain other points, and these as well in further detail, through correspondence, if the reader is minded to address me.

First with respect to general expenses: An account with general expenses, by which is meant all those expenditures which are of such a character as to make it impossible to charge them specifically to the jobs and contracts, is to be opened up. It is to receive the charges as they occur. Instead of waiting to the close of the year to deduct the amount of this account from the gross profit, the expenses are to be prorated or distributed as the work proceeds.

For this several plans may be suggested, to only two of which will we give attention. Both of these anticipate at the outset an estimate of what the gross amount of the general expenses will be for the year. This is to be made out in the light of the experience of the past. If general expenses amounted to $10,000 last year, and we expect our rate of expenditure will be about the same this year, then $10,000 very possibly is the figure we will fix upon as the basis of our calculations. If we estimate that our contracts for the year will cost us in labor and materials $200,000, then by way of distributing this amount we should put into the costs of each operation an amount for general expenses equal to five per cent. of the cost of materials and labor.

When we charge up this amount to the job, we of course credit the general expense account. Then the accuracy of our estimate of expenses, etc., and the correctness of the basis of our distribution will be demonstrated by the expense account balancing at the close of the year. If it does not balance, the discrepancy must be adjusted through the loss and gain account.

As the transactions of the year proceed, we watch the indications very carefully. If it becomes evident that our percentage allowance is too large or too small, we vary it accordingly.

The above represents one plan of prorating expenses. The objection to it is that, comparing contracts one with another, materials and labor vary in their respective proportions, and also in relative cost. Some jobs are more in materials and less in labor; others are almost all labor. Sometimes the materials are relatively very expensive, and in other cases they are very cheap. Occasionally all the labor is of a common grade, and then on another job the labor is all of high skill. One year's business may run to one extreme and the succeeding year's business to the other. Is there then a better basis for distribution of general expenses than a per cent. on general costs?

Manufacturers in various lines, for a long time past, have used the labor part alone and have based the percentage for distribution purposes upon it. Lately they seem disposed to go a step further, using as the unit or basis the "man-hour," that is, the hours of labor irrespective of price paid. The application of this plan would be as follows: Ascertain the number of hours' labor expended upon all your contracts last year by employees of all grades and kind. Divide your total general expenses for last year by this number. The quotient will be the price per man-hour that your expenses have been costing you. Keep careful track of your labor on each job the present year in the same general way, and in closing up the account of the cost of each contract, charge it with an amount equal to this price per man-hour, multiplied by the number of hours' labor expended upon it. Credit this amount to the general expense account in the same way as explained in connection with the first method.

Now as to materials carried in stock: Open up an account, to be called by some such term as "Materials," to which charge everything in the shape of material that cannot be charged direct to the contracts. When materials are taken from this general stock for use on special jobs, charge the jobs with them (always at cost) and credit materials. The balance in Materials Account then at all times will represent the amount on hand at cost prices. Any materials which have been charged to a contract that are left over on completing it are to be changed back to Materials Account, when they are put in stock and the account with the contract credited in like amount.

It is advisable not to use chrome greens on new walls as there is danger of their being turned in color by the presence of the caustic lime in the wall. The steady glare of gaslight, too, has been known to have a yellowing effect upon these colors.

Tar spots on woodwork are difficult to remove, and always show through subsequent oil paint coatings which become dirty and do not dry. To prevent this the tar should be scraped off as much as possible, and the spots coated twice with a strong glue water, which will insulate the tar completely.

CABLE SYSTEM VS. DERRICKS FOR QUARRIES.

Mr. J. B. Gordon writes to Stone on this subject, as follows: One cable stretched over a quarry, say only a distance of 400 feet, and 400 feet additional over yard room, making 800 feet between towers, controlling a space 800 feet by 60 feet: This would require at least eight ordinary derricks to cover the same and eight double drum engines, eight engineers and at least three men for each derrick, tugging and hauling booms around, say a force of twenty-four derrick men. Then they will not accomplish any more work than one twelve or fifteen ton capacity cable plant. For the cable plant only one engineer is required and four or five men to attend to the chaining and dogging of stone. There is no forced work, but a clean lift and rapid travel to any part of yard. All refuse is put in large skips, taken up and carried to dump pile at one handling; no guys in the way or to be made taut every few days; no jerking and breaking down masts or booms, only the towers to be kept painted at regular intervals.

The first cost of a cable plant is not any more than derricks and engines to do the same amount of work, with a saving of more than half the expense running the cable system, and yet it is very strange that quarry owners will keep on in the old rut.

MATERIALS FOR A SKYSCRAPER.

An idea of the amount of material required in the construction of a modern office building can be gotten from the following figures furnished by Mr. McCaul, who has charge of the construction of a sixteen-story skyscraper in Philadelphia:

About 8,000 cubic yards of excavations; 4,000 yards of concrete and stone masonry; 4,371,555 pounds of steel; 300,000 pounds of ornamental iron; 36,000 pounds of ornamental bronze; 10,000 cubic feet of granite, weighing 900 tons; 260,000 square feet of fire-proofing, weighing about 3,600 tons; 1,360 tons of patent mortar used in plastering, to cover 42,000 square yards of plastering; about the same amount of cement mortar used in brick and stone masonry; 40,000 square feet of Pevonizza, Numidian and Italian marble; 15,000 pounds of nails; 10,000 cubic feet of terra cotta, weighing about 290 tons; 325,000 face brick; 1,500,000 common brick; 24,000 square feet of glass, weighing about 73,660 pounds; about thirty miles of electric piping to encase the electric wiring throughout the building, and about ten miles of plumber and steam fitters' piping. There were on an average 200 men working on this structure from the start until the finish.

THE MARKET FOR BUILDING SUPPLIES IN SOUTH AFRICA.

A steadily increasing demand for various classes of building materials is reported from South Africa. The demand includes such materials as doors, blinds, flooring, metal ceilings, car material, iron pipe, and contractors' supplies, as for example, road scrapers, wheel barrows, shovels, picks, etc. There is to be held at Grahamstown, in December, the South African Exhibition. The Canadian government has appropriated $5,000 to defray the cost of a Canadian exhibit, and has also chartered a sailing vessel to convey exhibits to the Cape. This vessel will leave Quebec a few days hence, and will carry freight at the nominal charge of $6.85 per ton. If sufficient cargo is forthcoming, a second vessel will be despatched at a later date. Canadian manufacturers of materials and articles above mentioned should look closely after the South African trade, much of which now goes to the United States.

USEFUL HINTS.

Carmine is readily affected by heat, turning to dull brown, and metallic salts have an injurious effect upon it. Exposed to strong light it is not permanent, fading away completely in less than six months, unless well protected.

Cement for Cracks in Hot Water Pipes.—Mix 1 oz. of powdered salammoniac with 100 ozs. of iron borings, and ram them well into the crack or joint; or else mix 12 lb. of iron filings, 2 ozs. of salammoniac, and 1 oz. of sulphur, worked up in water.

A paste with which wall paper can be attached to wood or masonry, adhering to it firmly in spite of dampness, is prepared as usual, of rye flour, to which, however, are added, after the boiling, 8½ grams of good linseed oil varnish and 8½ grams of turpentine to every 500 grams.

To Protect Iron Structures from Rusting.—Mix 1 part of quicklime with 5 parts of water, stir it up to allow the lime to settle; then pour off the clear water, and mix the lime with sufficient olive oil to make a thick cream, and paint this over the iron surfaces to be protected.

To Cement Iron Railings, Girders, etc.—Mix together six parts of sulphur, six parts of whitelead and one part of borax; then, when wanted for use moisten it with strong sulphuric acid, and place a thin layer of it between the pieces of iron which are to be joined. In five or six days the cemented pieces will be firmly attached.

In French hospitals the floors have been painted for hygienic reasons with a solution of paraffine in petroleum, which gives them a brown color and renders them entirely impervious. A single application is said to suffice for two years. Such floors may be wiped daily with a cloth saturated with an antiseptic solution. This device is of great importance to schools, hospitals and private houses.

There is no better way to clean a new pressed brick wall than with muriatic acid and water. All projecting stone sills and caps must be carefully covered up, especially if the trimmings are limestone or marble, as acid falling on the stone would discolor it. To clean an old brick wall scrub the wall with soap and water, and give it a coat of linseed oil with just sufficient Venetian red or other suitable staining color in it to hide the discolorations in the brick.

Lichen on Stone Buildings.—The green or black covering which forms on light colored stone after some time, has been found by Dr. Fruhling to be a lichen, and if once developed is hard to remove. Its formation, however, may be prevented by painting the stone with a diluted sulphide of potassium solution at intervals of one year. Leitzmann has attempted to wash off the houses with hydrochloric acid and found that this was effective for three to six years.

Cements and Putties for Masons' Use.—Dissolve alum in water until the fluid will not dissolve any more, then mix in this sufficient plaster of Paris to make a stiff dough and bake it; when baked hard and dry grind it to powder, and for use mix with water as wanted, and apply it like plaster. Various pigments may be mixed with it (while in the dry state, after baking and grinding) to make the cement imitate the color of any kind of marble it is required to cement or join. Joints made with this compound can be polished as smooth as glass, and thus the joint in the marble work may be rendered imperceptible.

Cement Coating for Iron Water Tanks.—Every good oil paint and red lead coating will protect the water reservoir from rust, and when it is perfectly dry will not give the water any noticeable side taste. The only drawback is that the oil coating does not last long. For this reason a cement coating is considered superior to oil paint. Cement dries perfectly in a few hours, and if it is made right, lasts at least as long as oil paint, while its cost is next to nothing. In the Experimental Brewery at Berlin, says the "Nordd Bangew Anzeiger," the lime and warm water receptacles are painted with cement, and after four years' use the coating has not yet required renewal.

FROM THE PARK.

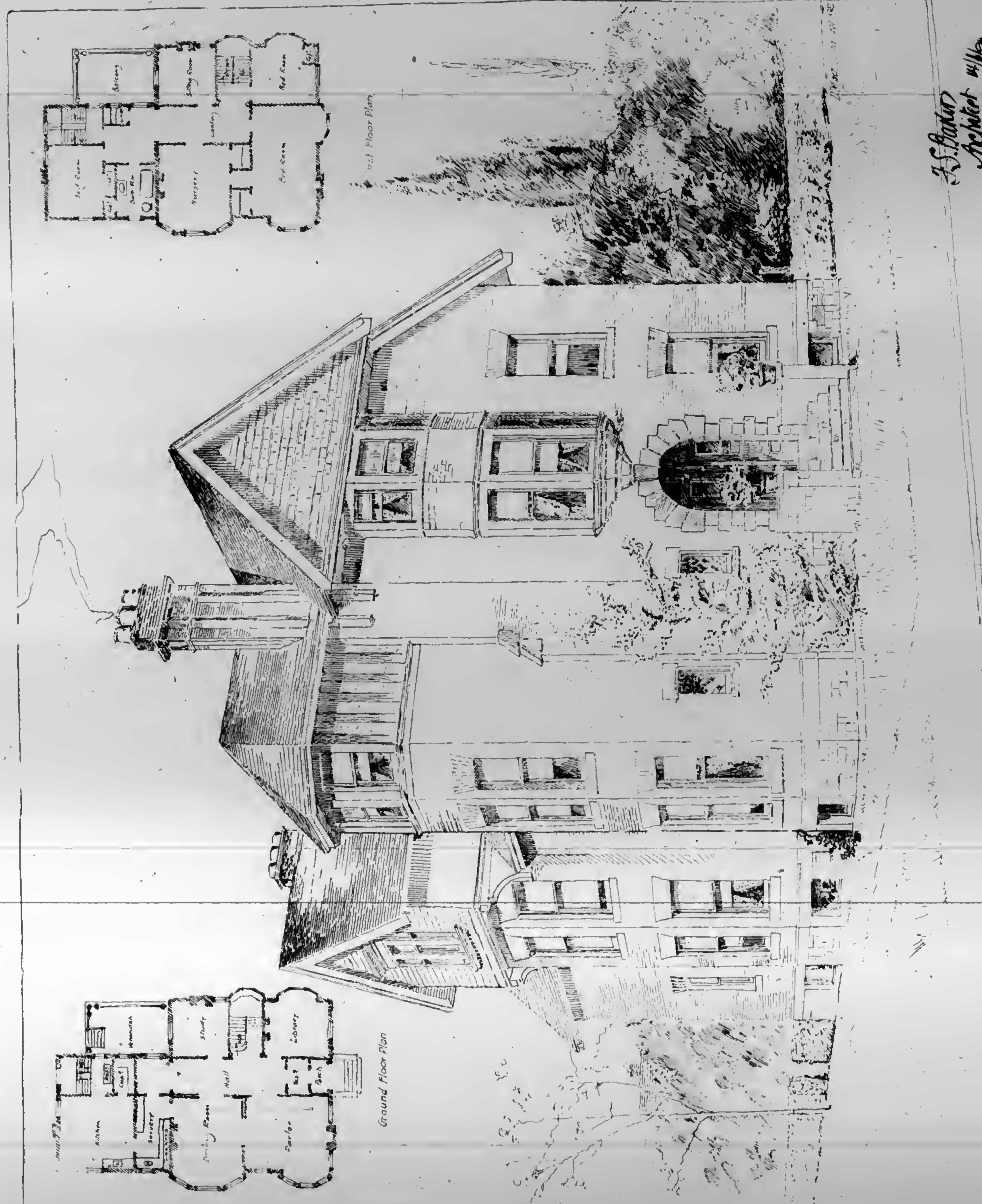
THE MAIN STAIRWAY.

FROM THE PLAYING FIELDS.

PRINCIPAL'S RESIDENCE.

TRINITY COLLEGE SC[illegible] PORT HOPE, ONT.

DARLING & P[illegible] ARCHITECTS.



[illegible] Residence, Bloor Street, Toronto.
F. S. Baker, A.R.I.B.A., Architect.

OFFICE BUILDING FOR THE LONDON & LANCASHIRE ASSURANCE CO, ST. JAMES STREET, MONTREAL.
EDWARD MAXWELL, ARCHITECT.

PASSENGER DEPOT, CANADIAN PACIFIC RAILWAY, VANCOUVER, B. C.

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The Crows Nest Pass Grievance. THE Canadian Pacific Railway authorities have issued a statement in which evidence is submitted to show that no injustice was practiced by the company in its dealings with workmen employed in the construction of the Crows Nest Pass Railway. The men's grievances are alleged to be due to the fact that they were unaccustomed and unfit for the kind of work which they engaged themselves to perform. A correspondent of a Winnipeg paper who claims to have thoroughly investigated the matter corroborates this statement. The public will no doubt reserve judgment on the case until the result of the investigation which is now being conducted by the government shall be known.

The Paris Exhibition. THE management of the International Exhibition to be held in Paris in 1900, appear to be extremely alive to the importance of providing novel and startling features such as will be likely to attract curiosity hunters. On the other hand, it appears that the accommodation for exhibits of the products of the leading nations is altogether too restricted for the requirements. The United States Commissioner is endeavoring, with little chance of success, to obtain 500,000 square feet of space, in lieu of the 150,000 square feet allotted to that country. Great Britain is moving in the same direction. This great Dominion is expected to crowd its exhibit into 12,000 square feet. When a nation invites the world to contribute to an international exhibition, it should provide accommodation on a more liberal scale.

Climatic Changes in Relation to Building. MARKED changes are taking place in the climate of Canada, particularly in the Northwest and Ontario. As a rule, the winters are shorter and less severe than a quarter of a century ago. In the Northwest the much dreaded early frost has to a large extent disappeared. These favorable changes are no doubt rightly attributed to the cutting down of the forests and the increased area of land under cultivation. Climatic changes of a less agreeable and beneficial character have likewise been induced. Prominent among these are lessened rainfall and increased wind pressure, de-

veloping on occasion into hurricanes and cyclones, like to that which last month devastated a portion of the town of Merritton. It is to be hoped that wind storms approaching in velocity the one referred to are not likely to occur at frequent intervals in the future, as the result of changed climatic conditions. At all events it would seem that increased wind pressures are likely to characterize the climate of this country in the future. Architects would do well, therefore, to take this new factor into account in the designing of their buildings, and exercise greater care than hitherto in the design and construction of roofs and projections, such as chimneys, towers and spires.

What an Achitect Should Know.

ARCHITECTS owe it to themselves, as well as to their clients, to make themselves thoroughly acquainted with the history of Architecture. If this were the universal practice, meaningless and out of place features in design would not greet us at every turn as they do at present. The fact should be apparent to every designer that if his work is to be above ridicule, it must be founded on an accurate knowledge of architectural styles. Herein lies the principal difference between true and sham architecture. The architect who places a lych gate at the entrance to the grounds of a summer residence, proclaims himself ignorant of the knowledge which is a first requisite of his profession. This, however, is precisely what a city architect of our acquaintance did quite recently. Hitherto, in Canada, no adequate opportunity has been afforded for the study of architecture, yet books on the subject have been sufficiently available to render inexcusable such glaring displays of ignorance. With Departments of Architecture, in charge of competent professors, at McGill University, Montreal, and the School of Practical Science, Toronto, supplemented by the examinations of the Province of Quebec Association of Architects and the Ontario Association of Architects, means now exist by which students may become thoroughly equipped for the practice of architecture, and the work done in the future should be to a large extent free from the absurdities and crudities of the past and present.

The Proposed Palace Hotel for Toronto.

WE print in this number a reproduction of a water color drawing, by the architects, Messrs. Geo. Harding & Gooch, of New York, of the design for the palace hotel which is shortly to be erected in Toronto. We learn from Mr. Aemelieus Jarvis, the promoter of the enterprise, that it has been decided that the building shall consist of nine stories, instead of seven as shown in the illustration. In lieu of illustrations of the plans, which are as yet in a transition state, we give a letterpress description of the general character and arrangement of the building. The carrying out of this undertaking will especially benefit that section of the business portion of the city bounded by Yonge, Adelaide, Front and Jarvis streets, where a large amount of city property is located. In conjunction with the improvement of St. Lawrence market, it will no doubt be the means of stopping the present tendency of trade to move westward and northward, and save a heavy slump in real estate values within the district described by the above-named boundaries. It is to be hoped that the City Council will deal with these important projects with greater celerity than has marked their deliberations in connection with awarding the contract for elevators for the new municipal buildings.

Day Labor vs. Contract.

THE Dominion Trades Council, in annual session at Winnipeg recently, reiterated its previously pronounced opinion that all public works should be carried out by day labor rather than by contract. A committee was appointed to urge this view upon the government and endeavor to secure its adoption in a practical way. We are not in a position to say what purpose is actuating the Trades Council in seeking to bring about this radical change. Probably, it is thought that if all public works were under the direct control of the government, there would be the opportunity to compel the employment on such works of union labor only. Regarded from this point of view, we can see where advantages might accrue to organized labor. From the standpoint of public economy, however, experience has demonstrated that the minimum of cost in the construction of works of this character is attained under the contract system. Not long ago, the municipal authorities of London, England, took the construction of public works out of the hands of contractors, and had them carried out by day labor under the direction of the municipal officials. The result was not satisfactory. While in a few instances savings were effected, in others the losses were so great as to more than offset them. The experiment was tried for a sufficient length of time to permit the results to be averaged, and the total showing was most unfavorable to the day labor plan. The same results followed more limited experiments in the same direction by the Council of the city of Toronto. There is no ground to hope that the outcome would be different were the method to be tried in connection with government works.

Workingmen's Relief Systems.

THE principal features of the Workmen's Compensation Act, which recently passed the British Parliament, and which is now in operation throughout the United Kingdom, have previously been referred to in these columns. In view of the extent to which this legislation departs from all past precedents in the direction of placing responsibility for the workman's safety entirely upon the shoulders of the employer, the latter has suddenly found himself placed under obligations such as he had never dreamed of, and for which, therefore, he was entirely unprepared. The adoption of this legislation in Great Britain is taken as an indication of what should be expected and prepared for on this side of the Atlantic. Employers of labor in contracting and other lines in Canada should therefore give this subject consideration, and acquaint themselves with the nature of the legislation thus far enacted by other countries for the protection of the laboring classes. Some particulars of the German Workingmen's Insurance System, as presented by Mr. J. C. Monagahn, U. S. Consul at Cheming, should prove interesting in this connection: The system aims to alleviate the condition of workmen and their families (1) in cases of sickness, (2) in cases of accidents incurred at work, (3) in cases of feebleness, wasting diseases, decreased capacity for work and old age. In cases coming under No. 1 there is given free medical treatment, money during period of sickness with which to obtain medicine, nourishment, etc., or, if desired, free treatment in a hospital and support for the family, and money, in case of death, is supplied the family. The fund is furnished by employers and employed the former paying one-third, the latter two-thirds. In cases of accident insurance the parties receive support during convalescence, from the fourteenth week after the accident happens. Money is given the wounded person from the fifth week. Rents ranging from two-thirds to three-fifths of the workman's yearly salary, are paid from the first day of the fourteenth week after the accident. The fund for burial purposes is furnished by the employers. In cases coming under invalid and old age insurance, the parties receive rents from the time they are unable to work, without regard to age; old age rents, from the seventieth year, even if they can work and do not draw invalid rent, as assistance against disease so as to prevent incapacity. In case of death or marriage, the full sum paid by the party is returned. During the period from 1885 to 1897 the employers paid under this system $318,382,399, and workmen $279,281,053, a total of $597,663,452. Out of this sum there was paid for relief $405,121,816, so that the workmen received $125,830,600 more than they contributed. The annual amount paid out is increasing at the rate of $3,570,000 per annum. The reserve fund at the end of 1897 amounted to $202,500,000. Every twentieth person of the population has been paid insurance, under one or other of the above heads. It is said that under this system, notwithstanding the low standard of wages prevailing, poverty is practically unknown in Germany. While it might not be considered necessary or wise to adopt, in this new country, the German system in its entirety, legislation which would make it compulsory on the working classes to contribute to a fund from which they could draw in time of need or old age, would seem likely to operate to their advantage in particular, and be a means of promoting the national welfare.

STYLE.

IT is a generally received view that true architecture ended with the beginning of the Renaissance, because traditional architecture ended then. It is certainly not true that it is only traditional architecture that is or can be genuine, and it is open to question whether there cannot be as much style in architecture now and in the future as there was in the days when only one style was recognized at a time.

In the days before the Renaissance, style in architecture was of the kind that obtains now in dress. Illustrations of contemporary life, such as the drawings in Punch, can be dated, over the limited period of history which is covered by that observer, with the precision with which the date of cathedrals is fixed by antiquarians learned in architecture. Somebody, some inventive mind, must be at the back of the fashions, but the ordinary tailor needs only to be a technicist, not necessarily an artist. And such were doubtless the master workmen who built, in the current style, the ordinary run of churches during the Gothic periods.

It is doubted by some people, and very naturally, whether there were architects at all in those days. There is no such doubt now. Architects are as common now as writers, and for the same reason that the art of architecture has become an art like literature. Like literature, its elements are common to all. All designers compound their work of the same forms in varied combinations. Like literature, there are leading characteristics which mark the work of each generation or each nation. Anyone who takes both English and American architectural journals can see that all English work is English and all American work is American, no matter in what historical line the fashion may be running. Finally, like literature, the masterpieces reflect the personal characteristics of the designer. The work of H. H. Richardson, bold in conception, large in scale, rich, but refined in line and in detail, was purely individual; the work of a big, black, fat man with a flaming necktie, preceded by a strong odor of perfumery, who nevertheless left upon the mind a first and final impression of high and intellectual refinement. When his works sprang up, all in a very short practice, and it was seen that they were not only real architecture and good architecture, but distinctively American, a wave of enthusiasm swept over the country. Here was the American style. Architects in the United States and Canada hastened to put their admiration into practice. But it was all a failure. The result was only a fashion of brutal masses grossly enriched. The imitators soon wearied of their own work. It was simply the case of Dickens, Carlyle or Ruskin over again.

In architecture as in literature there is a style which is the man. Imitators can discern the characteristics but the character behind which gives life to the work proves to be inimitable. This is style. What makes it? The analogy of literature may perhaps help us to see. What makes style in literature? It seems to be only the full expression of a man's own mind. For great work of course a great mind is presupposed; the masters whom we admire have full and rich minds to express, but their style in itself is not the greatness or beauty of the ideas expressed but the great and beautiful expression of them which the fervid mind, insisting upon expression, has worked out of the elements of expression which art supplies. Trueness of expression is the bottom of it all. Even narrow minds truly expressed have style in their degree. That which has no style, but instead the unfortunate quality of uninterestingness, is the class of mind which seems not to produce ideas for itself, but to keep instead a stock of them ready made, which expresses itself not so much by a process of conception as of recollection and seems to delight in ready made phrases which have been common property for generations until they have almost lost the power of making an impression upon the mind.

A college don may sometimes at a university dinner or convocation liken his college to a ship (a well used simile), and steer that vessel through storms, past shoals and into havens with an elaborate exactness of similitude that makes the pulses of his listening colleagues swell with the delight of literary workmanship. We may perhaps forgive the substitution of an academic grace for native style by such a speaker before such an audience, to whom literature is an end rather than a means, and its composition a sort of intellectual game. But alas for the artist, whether in words or bricks and mortar, who takes this kind of thing seriously; whose second hand ideas are not the result of an over trained mind so much as of a native lack of original quality, and culture not too great but too little. To him, if a poet, belong the whole list of similes, metaphors and epithets which are recognized as coming under the head of poetry. To him life is a journey, man a pilgrim, death a bourne; the moon is chaste or serene, clouds are fleecy or lowering; morn is ruddy, eve is dewy, and everything else is something that it has so often

been before that we have no difficulty in understanding that we are reading poetry. Our grandfathers liked this kind of poetry and dabbled a little in composing it. They built Gower street and other dull quarters of that period in this manner. In a similar manner we have whole streets of wooden porches or verandahs, which are Tuscan, Doric, Ionic or Corinthian, built up of boards in the likeness of trabeated stone. They are as a rule well done, and are architectural forms which content the eye if they do not delight the mind, so that we may be glad they are there rather than a worse thing. Indeed, a fuller application of the order to the house would be a measure of safety. But let us not mistake such a system of design for anything better in style than this poetry of conventional expression which our grandfathers affected. Such poetry would find no sale now-a-days, and there is every indication that the day of conventional architecture in England is also ending.

The movement towards true design seems to have had a wavelike advance. Starting as a reaction from the extreme convention of classic formality, and adopting truth as a watchword, it found itself soon drawn back again by formalism; Gothic formalism this time instead of Classic, that was all. The exposed construction which represented its idea of truth was not a large enough idea to save it from ending in a sham style. The movement seemed to come to an end, but in reality a younger generation has caught the idea and is finding that truth in design is something greater than the exhibition of construction. It is expression; expression of everything—of function, construction and material.

The object of seeking truth in design is not the avoidance of falsehood as an immoral thing, but to hold on to truth for its own sake; because to hold to it, however hard it may be to do so, is the surest road to making a good thing. To design is to make first and above all what might be called a functional plan and to express it in elevation. In the plan is contained all that makes the poetry of the building. It is not throwing it into recognized architectural forms nor covering it with recognized architectural ornament that gives real poetical expression, any more than a few elegant thoughts, expressed in terms culled from poets and arranged, by the help of the printer, in a pattern on the page, make poetry. These efforts are properly called verses. There is no convenient term of the kind to define the kind of architecture which compares with it; indeed production of this kind has so long possessed the exclusive right to call itself architecture that it seems like interfering with a vested right to deny it the title. But if architecture means the true poetry of building, it is to something else that the term should be applied to the functional arrangement of parts both horizontally and vertically so that the nature of the building is expressed as truly as the nature and functions of an animal or indeed of that majestic creation of our own, the locomotive, are expressed by their appearance.

In the matter of construction it is no more reasonable that it should always be displayed than it is that we should wear our skeleton on the outside; but we may take a hint from our bodies as to the way in which construction is the groundwork of form.

Truth to material is the easiest nut to crack, for most if not all material has character which any one who has feeling for architectural design ought to delight in bringing out, and this is easily done since every material is most easily used in the way that suits its special characteristic.

In these three elements of design function, construction and material the mind of the designer displays itself, and in making the design proceed from them lies the straight road to style, the style which is the man, which gives the quality to design no matter to what period it may lean in form. It represents the interest the designer took in his work when doing it, and will be the source of the pleasure which others take in it when it is done.

THOMAS FULLER.

The late Thomas Fuller, formerly chief architect of the Public Works Department of Canada, the intelligence of whose death at Ottawa last month was received with widespread regret, was born in Bath, Eng., March 8th, 1823, and was educated in Bath and London. His first large work (when only 22) was the cathedral at Antigua, West Indies, the erection of which he superintended. He came to Canada in 1857, and commenced practice in Toronto, with Chillion Jones of that city. In 1859 designs for the parliament buildings, departmental buildings and Governor-General's residence were invited by public advertisement. His designs were awarded for the parliament buildings first premium, and for the departmental buildings and Governor-General's residence second premium. On the 2nd December, 1859, he was appointed architect for the parliament buildings, and the work, under his supervision was formally commenced on the 20th December, 1859.

The Late Thomas Fuller.

In 1862 a Royal Commission was appointed to report on all the government buildings then in course of erection at Ottawa. In 1863, it having been decided to proceed with the works, new contracts were made with the former contractors; Thomas Fuller and Charles Baillarge were appointed joint architects for all the buildings. In May, 1865, the services of Mr. Baillarge were dispensed with, and from that period until 1867 the whole duties devolved on Mr. Fuller, when the buildings were completed, with the exception that the completion of the library and upper part of the main tower remained in abeyance for four years, and were then carried out by the officers of the department in accordance with Mr. Fuller's original designs.

In 1867 he entered into a competition for the state capitol at Albany, New York state, and was awarded first premium. In a second competition he associated himself with Mr. Augustus Laver and prepared a joint design, which was accepted.

Their design for the city hall, San Francisco, Cal., was awarded first premium, and being accepted, Mr. Laver then left to take charge of the work, Mr. Fuller remaining at Albany until a change of politics brought a change of architects.

In 1881 he was asked to return to Ottawa to accept the position of chief architect of the Dominion government. Having accepted this position, he remained in charge until he was superannuated in 1897. During his term of office there were erected from his designs 140 public buildings, which include six drill halls, the Langevin block on Wellington street, the printing bureau, all the experimental farm buildings, and many other prominent buildings.

He was elected a Royal Canadian Academician by Lord Lorne, and his original design for the Parliament buildings and Governor-General's residence are now in the National Art Gallery.

In 1853 he was married to a daughter of W. Green, J.P., of Bath, England, who survives him. Mr. Fuller also leaves three children, all of Ottawa—Mrs. Greene, wife of Mr. George M. Greene, barrister; Mr. T. W. Fuller, architect, Department of Public Works; and Mrs. Moore, wife of Mr. W. H. C. Moore.

ARCHITECTURE IN NEW ZEALAND.

Mr. R. Mackay Fripp, F.R.I.B.A., Victoria, B.C., sends us the following interesting though somewhat discouraging description of architectural conditions in New Zealand, from which country he has recently returned: I went to Auckland about two and one-half years ago and found building in a very extraordinary condition, particularly in the direction of domestic work which is extremely expensive and entirely without interest from an architectural point of view. Nearly all buildings are covered with mean little hip and valley roofs of galvanized iron which gives a very abject appearance to the town. The detail is entirely "stock" manufactured by the mills. Front doors are of a few stereotyped patterns. Inside doors, windows, skirtings and architraves, even verandah posts and mantel pieces, are all repeated hundreds and thousands of times; shingles applied to walls and gable ends and the thousand and one uses to which they are turned in this country are (or until I showed them how they might be used) practically unknown. Shingles split and uncolored are used for roofs, and soon turn black and twist, but galvanized iron is fast driving them out. The method of framing is much the same as in Canada, but timber being very costly, as much as $30 per mille for plain sawn stuff, it is used with greatest economy, there being no such thing as shiplap beneath the weather boards and finished floors, which are laid direct on the stud and joist respectively. Partitions and inside surfaces of walls are lined with rough boards 8 to 10 inches by ¼, 3-16 and ½ inch; though all sold as half inch in thickness, it varies tremendously. Scrim, a very coarse open-webbed material like sacking, is stretched, taped and tacked before the skirtings, architraves or wooden cornices are fixed. On the scrim, wallpapers, for the most part very commonplace in character, are laid. The ceilings are mostly composed of ½" x 12" boards with a moulded batten (mill stock, of course) nailed over the joints; and these flimsy, ugly mushrooms cost about twice as much as a well designed and carefully detailed house costs here. The labor is slow, the methods antiquated, and the architects being not quite but almost entirely drawn from the ranks of the builders, not frequently the architect cares nothing about his work beyond the interesting fact that a commission more or less reduced to meet the demands of his employer is attached to the "job." Such a state of affairs is hopeless, so much so that though a man of some ability occasionally finds himself in New Zealand, he almost invariably soon leaves in disgust.

During my sojourn in Auckland, I imported fine red roofing tiles made on a French system in Sydney. I also obtained a few thousand bunches of redwood shingles, and advertised for and found a couple of men who knew how to cut a shingled arch, lap a hip or an angle, and dip the shingles before laying. By refusing to use any stock door, sash, moulding or turning, and by designing everything myself, and seeing it made too in many cases, I succeeded in breaking through the stereotyped style of work, though not without some fierce opposition on the part of the builders, and less open but not less bitter resentment of many of the architects.

To give you some idea of the very great difficulty I experienced in getting work executed in New Zealand, I may mention that I made 24 sheets of detail drawings for a house that would not cost more than $5,000 here. Now that the ice is broken, so to speak, I hope and believe that the younger architects will keep the fight going and gradually improve matters.

UNIVERSITY OF CALIFORNIA COMPETITION.

The jury have given their award in the preliminary competition for plans for the University of California. Out of one hundred sets of plans submitted, the following have been chosen to enter the final competition: Barbond Bauhain, Paris; E. Benard, Paris; F. Blunschli, Zurich; D. Dexpradelles and Stephen Codman, Boston; Rudolph Dick, Vienna; J. S. Freedlander, New York; Howard & Eichmuller, Paris; Howard & Cauldwell, New York; Howells, Stokes & Hornbostel, New York; Lord, Hewlett & Hull, New York; Whitney Warren, New York. Successful competitors in the preliminary competition will have six months in which to perfect their plans for the final competition, and a sum of at least $20,000 will be devoted to premiums for the best plans. These premiums will be awarded to at least five of the competitors.

PERSONAL.

Mr. G. M. Miller, architect, Toronto, has removed to new and more convenient offices, Nos. 51 and 52 Victoria Arcade building, 18 Victoria street.

Mr. R. Mackay Fripp, F.R.I.B.A., has returned to British Columbia after an absence of two and a half years spent in New Zealand. Mr. Fripp has opened offices in the Board of Trade building, Victoria.

The firm of Simpson & Ellis, architects, Toronto, has recently been dissolved. Mr. Simpson retains the office formerly occupied by the firm at 9½ Adelaide street east, while Mr. Ellis has temporarily opened an office in the same building. It is underrtood to be his intention, however, to remove to new offices at an early date.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

Frequent meetings of the Council of the Association have been held during the last six months, at which matters of importance were considered. At the preliminary examinations held on July 28th and 29th, three candidates presented themselves, none of which, however, succeeded in obtaining the required number of marks. Owing to the increased responsibility to the public imposed on the Association by the Quebec Architects' Act, the Council have fixed as the programme of studies for the preliminary examination, the following: Arithmetic, Mensuration, Geometry, Algebra, Freehand and Linear Drawing, Universal History, Histories of Canada, England and France, also the translation of French into English, and vice versa.

The Council have given much consideration to amendments to the by-laws and regulations of the Association, as well as to applications for membership in the Association, of which there have been received 86, and accepted 75. The by-laws will be kept on view at the offices of the Association, where persons desiring to do so may examine them. The refusal of the application of Mr. Richard Waite, of Buffalo, for membership in the Association, gave rise to considerable comment on the part of persons unacquainted with the circumstances of the case. The following letter, addressed to the local press by the Secretary of the Association, will be a sufficient explanation of the matter:

"It is unfortunate that there is a tendency to rush into print without due knowledge of the subject dealt with. With reference to the paragraph in your issue of this date, reflecting upon the action of the P.Q.A.A. in refusing the application of Mr. R. A. Waite for membership, I beg to say that under our Act of Incorporation and By-Laws, without reflecting in any way on the ability and status of Mr. Waite, it is not in our power to accept him. Membership is restricted to those who were definitely and regularly practising in the province of Quebec previous to the date of the passing of the amendment of the act, and excludes those who may be domiciled in a foreign country.

JOS. VENNE, Sec. P.Q.A.A."

The 3rd and 4th of November are the dates selected for the eighth annual meeting of the Association, for which the following is the programme:

FIRST DAY.—Session to open at 10 o'clock punctually in the rooms of the Association, New York Life Building, Montreal. 1, Reading of the Minutes; 2, Presentation of the Annual Report of Council; 3, Statement of the Treasurer; 4, Election of Officers; 5, Address from the Retiring President. Afternoon session to open at 2 o'clock punctually. 1, Consideration of Amendments proposed to the By-Laws of the Association; 2, Motions by members and other business; 3, Address from the President-elect. Evening—Assemble at 7:30 at the Viger Place Hotel; Dinner at 8 o'clock; evening dress.

SECOND DAY.—1, Visit of inspection to the new building of Chemistry and Mining, McGill University, to meet at the building at 10:15; 2, to the residence of Hon. G. A. Drummond to view the Picture Gallery, to meet at 2:15; 3, to the Architectural Department, Engineering Building, McGill University, to meet at 3:30.

MONTREAL PLUMBERS' ASSOCIATION.

The Association recently appointed a committee to examine the amendments, recently enacted by the city council, to the city plumbing by-law, and make a report thereon. A committee has likewise been appointed to confer with the Council of Arts and Manufactures relative to the instruction to be given in the plumbing classes.

REAL ESTATE OWNERS' ASSOCIATION.

THE above association at a recent meeting gave expression to their regret that they had not been invited to participate in the discussions of the committee which has in hand the revision of the City Charter. The association likewise placed itself on record, as being opposed to the introduction in the new charter of any changes which would have the effect of increasing the present tax on real estate.

PLUMBING AND VENTILATION.

MR. J. W. Hughes, of this city, chairman of the Committee on Sanitation of the American Health Association, presented the following report at the meeting of that organization held in Ottawa last month:

From such information as has been obtainable from the large field covered by your committee, we are justified in reporting an increased interest in all matters relating to what may be termed practical sanitation, or the carrying out, in actual work, of the theories and plans of the advanced thinkers and experimenters in sanitary science. The work of our association and kindred organizations, as well as the untiring efforts of individual sanitarians in the past, has resulted in awakening an active inquiry and interest, and there is no longer heard the scoffing remark and sneering insinuation when an improvement is suggested that involves a pecuniary outlay. This is especially noticeable in the plumbing department of our work. We are of opinion that there is a tendency, in some cases, to rush from an extreme apathy and do-nothing policy to one of too great an elaboration and complication in the carrying out and planning of plumbing apparatus; safety, effectiveness and simplicity are the requirements. Sewers, public and private, are to-day better constructed and more carefully planned than in the past, but the question of the best method for the disposal of sewage has yet to be solved, and is becoming of more pressing importance every day. That our great towns and other centres of population can continue to use the rivers and streams as public sewers, without serious danger to the public health, goes without saying. We are pleased to note an increased and practical interest in the question of the disposal of sewage by means of irrigation farms and other plans than that of running it into the streams.

The ventilation of the public buildings is receiving the attention that its importance merits; the introduction of the power fan, combined with the developments of cheap electrical force, has opened up a large field of possibilities; whether the effectual ventilation of private buildings and dwellings will receive its solution from this source is a question. The greatest objection to the introduction of a system of ventilation into a private building, that will at all approach the necessities of the case, especially in northern climates, is the greatly increased cost of fuel. Fresh air cannot be introduced, warmed and expelled at the rate required for an apparatus that will be even approximately effective without a largely increased fuel bill. The question of effective and economical ventilation of dwellings is one presenting many difficulties and large profits to the inventor who can solve it.

A PROTEST AGAINST THE PROPOSED MONUMENT TO GENERAL MONTGOMERY AT QUEBEC.

THE Women's Canadian Historical Society have put themselves on record in the following resolution as being opposed to the erection of a monument to General Montgomery at Quebec: "That, whereas an international monument is proposed to be erected to Gen. Montgomery in the public square of Quebec, we, the Women's Canadian Historical Society, do hereby enter a protest against such action and do appoint a committee to deal with the question and to confer with the other historical societies in the matter."

THE City Building Inspector has ordered a house in process of construction on St. Lawrence street to be torn down. The foundations are declared to be defective. The inspector is deserving of commendation for his vigilant efforts to enforce compliance with the requirements of the building by-laws.

The eighth annual convention of the Association of Railway Superintendents of Bridges and Buildings is now in progress at Richmond, Va. An interesting and instructive programme, including a number of valuable papers, has been prepared for the occasion.

HAMILTON

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THE city of Hamilton, Ontario, known as the "Ambitious City," certainly occupies as beautiful a natural situation as any city in Canada. Those who visit it merely on business bent, fail to know it as it is worthy to be known, unless they spare a little time to take a run to the top of the "Mountain," (as it is erroneously called), and inspect the really fine view to be obtained from that height. The magnificent bay, and the lake beyond the "Beach," the well-wooded Dundas valley and the highlands beyond, form a picture well worth the visit; while the city itself, with its many picturesque residences half hidden by foliage, from that point of view is a very pleasing sight. The city, viewed from its own streets, does not look as attractive, but it is being vastly improved year by year by the sweeping away of old buildings and the introduction of new substantial business premises in their room. A walk round the residential portions of the city reveals, however, a remarkable sameness of design, and one wearies of the repetition of projecting tiled gables, overhanging stories and verandahs, so similar in outline if not identical. This is no doubt due to two causes at least, the materials at hand and cheapness desired by the owners. Picturesque effects are easily obtained, and at small cost, by the style commonly used. Few seem to care about the introduction of stone, and the new residences of stone might be counted on the fingers of one hand. There seems to be very little originality among the designers of houses, even in plan, for in outline, forty-nine out of every fifty houses seem to have the same general idea. Speculative building is to a certain extent responsible for much of the sameness; cheaply produced plans, used over and over again with little variation, have no doubt been found very convenient, but that is all the more reason why those responsible for the design of houses should at any rate try to get away from repetition. "Ambitious" as the city is supposed by outsiders to be, it is difficult to find evidence of this character in the place itself. It gives the appearance of being financially crippled. The streets for the most part are in a deplorable condition, except the two principal streets for say a couple of hundred yards or so from the centre of the city, along their lengths. Block pavements worn out beyond repair; grass growing where the traffic is not heavy, give it anything but an ambitious smile. On the whole the old macadam roads and the square, plainly built, hipped-roofed houses of thirty years ago are to be preferred to the attempts at modernizing.

As a summer resort, if money were to be invested with a view to attracting visitors, the natural situation of Hamilton would make it a formidable rival to Toronto, and one would like to find the citizens wake up to the advantages of their mountain slope for park purposes, instead of "kicking" because there is no money to lay out on the improvement of the "Gore." The Gore, let it be understood, is an area at the junction of the two principal business streets, of the shape the name implies, planted and turfed, railed in and jealously guarded against dogs; containing seats and a fountain with a dozen turtles in the basin. The Gore extends one block east and west, and at the widest part is about fifty feet across. The citizens have for years desired the extension of this magnificent park eastward 50 feet, but the thought of terracing their mountain has apparently never entered their heads.

BY THE WAY.

TRANSLUCENT oyster shells are said to be used instead of glass in the windows of the buildings in Manilla. An average window, 6 feet long by 4 feet wide, contains about 260 of such panes, which temper the heat of the sun, the shells being very low conductors of heat, and also prevent the blindness which is induced by the fierce glare of the sun in that part of the world.

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MR. Wm. Stuart, contractor, of Ottawa, has recently returned from Dawson City, where he erected a building for the Canadian Bank of Commerce. The expensiveness of material and labor may be realized from the fact that the building referred to, although constructed of logs, cost $13,000. Mr. Stuart is authority for the statement that lumber costs $200 per 1,000 feet. An ordinary pane of glass 16 inches by 12 inches can be bought for $2.50; a common door costs $22 and a newel $6.

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A BROWN stone monolith, measuring 15 feet in length and 9 feet at the base, was quarried at Washburn, Ohio, prior to the World's Fair at Chicago, the purpose being to transport it to the fair as a feature of the Wisconsin exhibit. After $5,000 had been spent on labor on this the largest block of stone ever quarried, funds could not be raised to transport it to Chicago and place it in position at the great fair. After having lain in a bed of sand and water for six years, the great stone will now be sawn into blocks and used in the construction of a residence and barn at Menasha. After all it will thus serve a more natural and useful purpose than the one for which it was originally intended.

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ON several recent occasions the Building Inspector of Montreal has compelled the tearing down of buildings which were constructed in a manner contrary to the provisions of the city by-laws. I have rarely if ever heard of action of this kind being taken by the building inspectors of Toronto and other Canadian cities. I am curious to know the reason. Are the architects and builders of Montreal lacking in knowledge as compared with those of other cities, or are they more eager to evade the law? Are the building regulations in Montreal more stringent, or is the inspector more alive to his duties than the gentlemen who occupy a similar position in other cities?

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THE first strike of workmen in the building trades is believed to have been that which occurred about 1450 B.C., in connection with the erection of the Temple of Thebes. The masons complained of the insufficiency of the monthly allowance of provisions granted to them by the contractor in lieu of cash. They stated that they were being cheated by the use of false weights by the contractors' clerks. The difficulty was temporarily tided over by the Pharaoh of the period making a liberal grant of corn to the dissatisfied workmen. This soon became exhausted however and the strike was resumed. The trouble only came to an end when the governor of the city, before whom the case was presented, drew an order for corn on the public granary.

The Cutler Manufacturing Company, of Rochester, N.Y., have published a monograph with ten plates of classical architecture on the shores of the Mediterranean, by Russell Sturgis, F.A.I.A.

ILLUSTRATIONS.

SOME ITALIAN DETAIL—ONE-QUARTER FULL SIZE.—MEASURED AND DRAWN BY WILLIAM RAE.

PROPOSED RESIDENCE, STEWART STREET, OTTAWA, ONT. BAND, BURRITT & MEREDITH, ARCHITECTS.

CLUB HOUSE FOR THE HAMILTON GOLF CLUB CO.—W. W. LA CHANCE, ARCHITECT.

The inside of the building is finished in Georgia pine, oiled and varnished. In the reception hall is a pressed brick mantel. The building cost $1,000.

STONE PULPIT IN ST. MATHEWS CHURCH, QUEBEC.—FELIX MORGAN, ARCHITECT AND SCULPTOR.

The pulpit was designed and executed by the late Felix Morgan, an English sculptor of merit, who was for many years a resident of Quebec, and who also executed two carved capitals in the transept arch of the same church. The pulpit is built of English sandstone. The columns are of various marbles; the cap moulding and figures of St. Peter, St. John and St. Mathew are of alabaster. The pulpit is a memorial of the late Rev. George Hamilton, for some time assistant priest of the church, during the rectorship of the present Bishop of Ottawa, uncle of the deceased.

PROPOSED PALACE HOTEL, KING STREET EAST, TORONTO. MESSRS. GEO. E. HARDING AND GOOCH, ARCHITECTS

The building will occupy the site of the Walker stores on King street east, with frontages on King and Colborne streets. The area of the site is 207 feet 10½ inches on King and Colborne streets, by a depth of 197 feet 7½ inches. The building, which is to be seven stories in height, is designed in the free Renaissance style. It will be surmounted by a roof garden 90 x 200 feet. An arcade, entered from an archway 48 feet from the western wall, will extend directly through the building, the entrance to which on Colborne street will be directly opposite Scott street. The plan of the building is in the form of the letter H, whereby is solved the problem of efficient lighting.

The Colborne street elevation is similar to the King street one, with the exception that there are no towers. In the centre of this facade an alcove is shown off the street, fitted with elevators for lowering supplies into the basement, without interfering with the traffic on the sidewalk. An entrance may be effected either from King street or through the arcade. The King street entrance occupies the corresponding eastern arch to the arcade. This leads into a handsome vestibule. To the left is the reception-room for ladies. To the right is the restaurant, facing on King street, this room being 78 feet by 48 feet.

Further on, and in the centre, is a rotunda finished in marble and tiles, in the eastern portion of which is the administration office; to the west is the main entrance from the arcade, immediately to the left and right of which leads the grand staircase to the first floor. To the north of the rotunda are four passenger elevators. The rotunda is lighted by domes at either corner, one of which is fitted for a reading room, another for a writing room. To the east of the department of administration is the dining room, opening from the eastern dome of the rotunda. This room is 140 feet by 42 feet. The southern 50 feet is divided off by a colonnade. To the right and west of this inner dining room is situated the cafe, reached from the rotunda or dining room. The bar is entered either from the arcade or rotunda, and from it an entrance can be effected to the cafe.

Baggage is brought in from the southern end of the arcade, where it may be sent by elevator to any floor or to the storage room in the basement. That portion west of the arcade is divided into 10 shops, two of which front on King street, thus the whole of the land area is occupied by the ground floor.

The first floor is reached either by the grand staircase or elevators, which open out on to a palm garden 60 feet by 56 feet, with alcove for orchestra opposite the staircase, of 48 feet by 30 feet. To the right and south are the state apartments and ball room. The state apartments are a suite of seven rooms, so arranged that they can be excluded from the hotel. Also in the event of a ball, banquet, or other entertainment, this portion can be excluded, and guests arriving by the arcade come up the grand staircase, which can be screened off from the rotunda. The ball room is 120 feet by 50 feet, 22 feet high, and overlooked by a balcony. This additional height is gained by dropping the floor five feet and by lowering the ceilings of the bar room and two of the arcade shops, but still retaining a 15 foot height for them. To the left and north on the King street front is a grand salon flanked on either side by a reception room, and the larger and more handsome guests' bedrooms. The 2nd, 3rd, 4th, 5th and 6th floors are divided into 63 bedrooms each, with 40 bathrooms, which, together with those on the first floor, make a total of 325 bedrooms and 213 bathrooms.

The centre of the basement or kitchen is occupied by the range boilers and cooks' tables. Immediately opposite is the "garde manger." The cafe and dining room on the south and east ground floor are served from here to the right and left. All supplies are brought in from Colborne street entrance by the lift, already described as being situated in a recess, and are received in a receiving room, from which point the various articles are distributed to their proper destinations. The engine room and boilers are in the south-west portion, in which room are situated the pump and tank room, ice-making, refrigerator and laundry machinery. On the east are the store cellar, flour room, bakery, the cooks' dining room, confectioner, ice cream making, wine cellar. To the north the servants' dining room, with toilet rooms adjoining. This floor also contains barber shop, gentlemen's general toilet and lavatory, Turkish baths and billiard rooms.

PLANS FOR ARTIZANS' DWELLINGS.

AT the Mechanics' Fair, which opened in Boston on the 10th inst., under the management of the Mechanics' Charitable Association of that city, the designs for artizans' dwellings submitted in competition by architects of the United States and Canada, for the Shattuck prizes, are exhibited. The problem which the competiting architects were asked to solve, was to provide upon four acres of land in the suburbs of a large city for the housing of fifty artizan households in an attractive, agreeable, sanitary and independent manner, in such a way that the property shall be recognizable as a single property, and shall provide, at rentals within the reach of the artisan class, a fair return upon the invested capital. The land is square and is bordered upon one side by a street the main thoroughfare of the suburb and it is valued at fifteen cents per square foot. The programme is purely an imaginary one, and its somewhat indefinite requirements are made purposely so, since it is conceived that an investor of a philanthropic turn of mind, with abundant yet not limitless resources, would seek advice from his architect in about as indefinite language.

INTERIOR LIGHTING.

A COMPETITION was recently instituted by the American Luxfer Prism Co., of Chicago, open to the architects of America, for building designs, the essential feature of which should be the securing of improved natural interior light. Fifteen graduated prizes, amounting in all to $5,000, were offered the competitors. A committee of award was appointed, consisting of Messrs. D. H. Burnham, W. L. B. Jenney, William Halabird, Frank S. Wright, architects, and Prof. Henry Crew, of the Northwestern University. The committee, having concluded their labors, report that 39 designs were submitted, each having been numbered as received, and discussed always under the title of its number. Only fourteen were found to be deserving of any prize whatever. To the authors of these fourteen designs, prizes have been awarded in the following order of merit:

1st prize, $2,000—Robert Spencer, Jr., Chicago, Ill.
2nd " 1,000—Adami Boari, Chicago, Ill.
3rd " 500—S. S. Beman, Chicago, Ill.
4th " 300—Curtiss Hoffman, Chicago, Ill.
5th " 200—Frederick S. Sewell, Chicago, Ill.
6th " 100—James E. Fisher, Bloomington, Ill.
7th " 100—Hugo F. Liedberg, Chicago, Ill.
8th " 100—Frederick S. Sewell, Chicago, Ill.
9th " 100—Field & Medary, Philadelphia, Penn.
10th " 100—J. L. Wees, St. Louis, Mo.
11th " 100—J. L. Wees, St. Louis, Mo.
12th " 100—Alfred Fellheimer, Chicago, Ill.
13th " 100—David S. Williams, Fort Snelling, Miss.
14th " 100—Howard Bowen, St. Louis, Mo.

COLOR DECORATION.

THE following extract is from a lecture delivered by Mr. F. Scott Mitchell before the Master House Painters' Association of Hartlepool, Eng.:

"Any color may be made to serve two or more purposes by its use in different positions: (1) With respect to shape of surface covered, concave surfaces add a gray shade and subdue the tone of the color; convex surfaces reflect a maximum of light with the color, which thereby appears lighter and brighter; and flat surfaces give a medium effect. Another color should always intervene to give full value to this arrangement. (2) With respect to contrast with other colors in juxtaposition—A medium tone of color will appear dark by contrast with lighter tints, and lighter when opposed to rich, darker colors. It will appear assertive or subdued as it is contrasted with colors more or less subdued than itself.

Country houses admit of cooler coloring and plainer surfaces, because of the ever-present beauty of nature's landscape with flowers and foliage, that contrasts to the disadvantage of man's best handiwork, and if ornamental decoration be applied it should be of strictly conventional design on this account. Likewise, all coloring should be in neutral tints and shades, its value thus becoming enhanced by contrast with the incomparably brilliant products of nature all around.

Shop fronts in large and manufacturing towns should be always painted in light and cheerful tints, in face of the prevailing custom to the contrary. Wherever this course has individually been adopted, it has been proven that pale colors, if well varnished, last as long as their darker contemporaries, which are often a dirt color to begin with, while the lighter coloring actually mellows with age, and looks cleaner through the dirty accumulation of long neglect than the darker color did at the start. It is generally admitted that not only do the displayed goods look their best in contrast with pale tints on shop fronts, but the appearance of a whole street is improved, and thereby the whole town appears to greater advantage where this is already the prevailing custom.

Entrance halls should appear of medium warmth and be cheerfully inviting in general coloring, as special contrast to the locality outside.

Drawing rooms should present a smart contrast to the entrance hall, though still cheerful in treatment, as it is essentially a room for the entertainment of friends. Coloring may be light and airy, and such as will emphasize the complexions and dresses of ladies, as the drawing room is where they always have preference.

Dining rooms should be rich in coloring and not too dull. They should always be suggestive of richness and bountiful provision of the prime necessities of life, and sufficiently cheerful to have a stimulating effect on any who may approach the dining table with appetites impaired by worry or anxiety.

Bed rooms should give the impression of repose and cleanliness above all else, though not depressingly dull, since when sickness necessitates the occupancy of the room for any length of time, its decorations have much to do with the comfort and even the health of an invalid."

ARCHITECTURAL WROUGHT IRON.

IRON has been known and used for about five thousand years, says a writer in the Engineering Magazine. Tubal Cain, son of Lamech and Zillah (only seven generations from Adam) was "the instructor of every artificer in iron and brass." The British museum contains a piece of masonry from an inner masonry joint in the Pyramid of Cheops, the oldest known edifice built by the hand of man. In early history the power and skill of the blacksmith was deified in the person of Hephaistos by the Greeks, or of Vulcan by the Romans, and volcanoes were supposed to mark the spot below which, in the nether world, he worked at his forge in shaping the thunderbolts of Jove or the armor of Mars. Dr. Schliemann, in his excavations at Mycenæ and Troy, found numerous specimens of wrought iron, some of which may now be seen in the museum at Athens; Greek painted vases show anvils, hammers, pincers and bellows, and welding is said to have been invented by Glaucos, of Chios, 600 B.C.

In the twelfth and thirteenth centuries the blacksmith who could fashion an elaborate hinge was accounted the master of his trade, as in Venice was the bricklayer who could build successfully the fantastic chimney tops of that city. At that time bar and sheet iron were not to be found already manufactured, and the use of the file was not known; but the paucity of materials and tools brought about great skill in the use of the hammer, and as, with the gradual introduction of mechanical appliances, many difficulties, especially of large or intricate pieces, were overcome, by degrees manual dexterity declined. The working in iron possesses, in common with painting and sculpture, the charm of proceeding directly from the hand of the originator; the personal element is pronounced.

TO REMOVE INK SPOTS FROM PAPER.—Shake 20 grams of lime chloride in 30 grams of distilled water until dissolved, let stand for some time, pour off the clear liquid into a dark (blue) flask and add 5 grams of acetic acid to this liquid. In order to remove writing, etc., paint it with the fluid, using a fine hair pencil, press with blotting paper and dry. By this method erasures are avoided on the paper, which is important with documents and other valuable manuscripts.

STUDENTS' DEPARTMENT.

C. A. & B. STUDENTS' COMPETITION.

THE publisher of the CANADIAN ARCHITECT AND BUILDER invites architectural students to submit drawings in competition for designs for four ornamental chimneys, for which first, second and third prizes of $15, $5 and one year's subscription to the ARCHITECT AND BUILDER, respectively, are offered.

The chimneys may be of brick, stone or terra cotta, or any or all of these combined.

Competitors are required to show by plans, perspective sketches and details, with or without elevations, the chimneys and sufficient of the plan and arrangement of building to explain the reason for form and position adopted, and to show roofing and other adjacent features it affecting the treatment of the chimneys.

Drawings must be made with pen and perfectly black ink ONLY, on white drawing paper, bristol, or tracing linen, to the size of 15 × 21 inches, and must be so drawn as to give their proper effect when reduced to one-half this size. No brush or color work is permitted.

The competition will close at 5 o'clock p.m. on Thursday, December 1st, 1898. No consideration will be given to drawings which may be received subsequent to that date and hour.

Drawings should be sent by mail or express, addressed to the editor of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto, and marked on the outside "C. A. & B. Competition." All postage and express charges are to be paid by the competitors. Each drawing should be marked only with the non de plume of the author, and should be accompanied by a sealed envelope marked with the same nom de plume and enclosing the full name and address of the competitor. This envelope will remain sealed until the competition is decided.

The merits of the designs which may be submitted in this competition will be decided by a joint committee, composed of officers of the Ontario Association of Architects and the Province of Quebec Association of Architects, whose decision will be final.

The right is reserved to withold one or all of the prizes if, in the opinion of the judges, the designs submitted should be so inferior as to warrant such a proceeding.

Students are requested to read carefully the above conditions, absolute compliance with which will be required of each competitor.

GIORGIO VASARI.

THE renowned architect and painter of Arezzo was born in 1512 and as early as the year 1524 he was taken to Florence, where he studied design under competent masters. Subsequently he travelled to Rome and other places, where, as he himself says, "I set myself to design all the best works that I could find, nor was there anything remarkable at that time, whether in Rome, Florence or any other place wherein I sojourned, that I did not copy in my youth, works ancient and modern, in sculpture and architecture, as well as paintings."

As an architect, Vasari stands deservedly higher than as a painter; as an historian of the arts, he occupies an eminent position, for he is the source from which all other writers draw their best and most important materials. Worn out by the pains and fatigues of a life unusually active and laborious, Vasari closed his mortal career on June 27, 1574, in the sixty-third year of his age, crowned with fame and honors and very sincerely lamented. His remains were conveyed to his native city of Arezzo, where they were laid in the tomb of his family, within the principal chapel of the Decanel church. He left behind him a very great reputation, more perhaps for the vast number than for the excellence of his pictures, but the beauty and perfection of his architectural works are universally admitted, and he was indeed an accomplished architect.

ENGAGED COLUMNS.

THE use of colonnades partially built into a wall, as we see exemplified in the banquetting hall at Whitehall, is not uncommonly condemned as a departure from the dignity and real use of columns, and as something false or absurd. If tested by the standard of common sense, there is no sufficient ground for such condemnation. Columns are points of support, and we may with equal correctness consider them in that light, whether insulated or engaged, for as supports they are equally valid in either case. We may regard the wall intervening between engaged columns as the means of enclosure, not of support—assisting the columns, it may be, in the support of the entablature, but not an essential and integral part of the fabric. The great Doric temple at Agrigentum and the Erechtheum at Athens suffice to show that even in the best period of Greek art this practice was not held to be opposed to the canons of good taste. The critics who would condemn engaged columns have, of course, a wide field for the exercise of their censorship in the engaged pillars or wall shafts of Mediæval art, the use of which is an exactly analagous practice, inasmuch as they represent the points of support of the arches and vaulting which spring from the capitals. The truth is that there is perfect masonic propriety, whether in the wall shafts of a cathedral or in the engaged pillars of a Greek temple. They represent an accumulation of power at the particular point of the wall on which the principal weight is charged; and not only have they constructive truth to justify them, but also great æsthetic value. These vertical lines of support convey to the mind the idea of the active and efficient support of any particular imposed weight far more satisfactorily than can be effected by presenting a plain unbroken wall of apparently uniform solidity and strength, and this idea is still more forcibly and distinctly produced on the mind when the vertical engaged shafts are of different color and material from that of the general surface of the wall. This practice, so prevalent both in Mediæval and Classic art, gave rise to additional beauty and variety by the use of colored and polished marbles.

A ready means of taking a fac-simile copy of a drawing done in ink which contains a salt of iron or copper is to lay over it a sheet of paper which has been moistened with yellow prussiate of potash and pressing on it, when the iron or copper salt will react on the paper and leave a copy wherever it comes in contact with the ferro-type paper.

MANUFACTURES AND MATERIALS

THE ST. JOHN, N.B., EXHIBITION.

UNDOUBTEDLY the most important and attractive display made by any firm at the recent exhibition at St. John, N.B., was that of the James Robertson Company, Limited, of Montreal, Toronto and St. John, manufacturers of plumbing supplies. The booth containing the company's exhibit was artistically painted and festooned with bunting, while a background of black velvet served to display to best advantage the white porcelain, brass and nickel goods. The exhibit included a decorated "Acme" syphon closet with automatic attachment; a large roll rim enamelled bath, with hot and cold shower bath attachment; an Italian marble lavatory and bath room complete, with gas water heating device for same; Imperial porcelain wash-tubs, enamelled sinks of all descriptions, copper and galvanized boilers, brass fittings, decorated basin, patent overflow and common overflow, etc., etc.

THE C.P.R. CEMENT WORKS.

The report comes from Vancouver, B. C., that negotiations are nearly completed whereby the C.P.R. cement works, on False Creek, will become the property of an English syndicate. It is said that the purchasers will install a new plant, with a capacity of one million barrels per year. The present output is only about 12,000 barrels, half of which is used by the C.P.R. Raw material for the manufacture of cement is available in abundance in the immediate locality.

TESTS OF WINNIPEG CLAY.

BY direction of the city council of Winnipeg, Mr. H. N. Ruttan, city engineer, recently sent to the Diamond Brick Company, of Kansas City, a number of samples of clay, taken from deposits in the neighborhood of Winnipeg for a test and report as to their adaptability for use in the manufacture of paving brick. The results are embodied in the following report:

Sample No. 1.—Soft blue clay; requires no grinding; wet; requires very little water in mixing—should be handled as dry as possible; drys well; does not check; shrinks very little; stands heat well; does not vitrify at approximately 1800 degrees F.

Sample No. 2. Hard slaty shale; requires careful grinding; requires water for mixing; works well in brick machine; checks very little in drying; stands heat well; does not vitrify at approximately 1800 degrees F.

Sample No. 4. Soft red clay; very tough; no grinding; mixes easily; works well in machine; checks very badly in drying, and on that account very difficult to handle. (Samples too much broken up to burn.)

Sample No. 5. Soft yellow clay; no grinding; requires very little water in mixing; works well through machinery; dries without checking; burns well; color when burned light cream, specked with iron; would make fine building brick if repressed or made by dry process.

Mixture of 1 and 2 equal parts. Works well; makes good brick but not suitable for paving; see memorandum.

Mixture of 1, 2, and 4, equal parts. Best results obtained from this mixture; works well through machine; dries well; very little checking; probably will make a good paving brick; see memo. of tests.

It will be seen that none of these clays worked alone will produce a good paving brick.

In accordance with your request, we combined Nos. 1 and 2 with the results as stated. The most satisfactory results were obtained from the mixture of Nos. 1, 2, and 4. In these bricks you will notice that while perfect vitrification has not occurred, still there has been a sufficient amount of heat applied to make the bricks very compact.

The rattler test shows that the bricks do not chip to any extent, but wear off evenly. The absorption is quite high, but this could probably be reduced by using a larger proportion of No. 4. We think if the clays can be conveniently combined, you may expect very excellent results in the paving brick line.

The samples of No. 4 were so badly broken up by checking in the drying process that we had nothing in shape to burn, but we are putting samples of the same material through a further process and if we obtain results that are worth reporting, we will communicate with you.

It is possible we could have obtained results more satisfactory to your friends if we had been told the relative location of the bodies of clays from which samples were sent us. Other combinations might prove of value.

In presenting this report to the city council Mr. Ruttan says:

"Some of the samples have proved satisfactory by themselves, and the mixing of Nos. 1 and 2 and 4 is without doubt a very good paving brick.

The following comparison with the Chicago specification is most satisfactory:

ABRASION.

Chicago—Time in rattler	1 hour.
Allowed maximum loss	8 per cent.
Winnipeg—Time in rattler	30 minutes.
Average loss	4-10 of 1 per cent.

ABSORPTION.

Chicago—Time in water	72 hours.
Allowed maximum absorption	2 per cent.
Winnipeg—Time in water	48 hours.
Absorption	8-100 of 1 per cent.

SPECIFIC GRAVITY.

Chicago, not less than	2.1
Winnipeg	2.18

While the collection of the clays to make the mixtures would add considerably to the cost of the brick, the price laid down in Winnipeg would probably not exceed $16 per thousand. This is about two-thirds of the cost of imported brick. The cost of brick pavement on a six-inch macadam foundation would make it about $1.80 per square yard."

It is reported that a new company is being formed to take over the quarries and assets of the defunct granite companies at Beebe Plain, Que.

The works of the Toronto Lock Company at Oshawa, Ont., have recently passed into the hands of the Oshawa Stove Co., who will engage in the manufacture of furnaces, builders' castings, etc.

The Standard Drain Pipe Co., of St. Johns, Que., have commenced the manufacture of salt glazed vitrified paving bricks for sidewalks. Bricks of this character have been in use for this purpose for many years in American cities.

Cement roofing tiles, the manufacture of which was introduced about two years ago in the United States, is of long existence in Europe. In Bavaria, Switzerland, and other countries where the climatic changes are sudden and of destructive nature, and where no roofing material has withstood the ravages of elements any considerable length of time, cement tiles are said to have been found efficient in every respect.

The manufacture of enamelled paper bricks is reported to be assuming practical form and giving promise of satisfactory results in Europe. The bricks are made hollow, the object of this being practically the same as that sought in the making of hollow forged steel shafting. Not only is a defective centre removed, but it is possible to put a mandrel into the hollow, and by applying pressure the walls are operated upon both from the inside and outside. When a solid body is heated, the temperature of the interior always varies from that of the outer portion at first, often resulting in the expansion of one or the other that causes defects. For these reasons the bricks are made upon the hollow principle and plugged afterwards.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES.—READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Bedding Bricks.

If left to his own way, the bricklayer, as a rule, will not use more mortar in flushing up his work than he can avoid, yet the importance and necessity of solidly bedding the bricks and effectually flushing up the interior joints—particularly the cross joints—is scarcely measureable. Apart from solid bedding and "flushing up" the brickwork, as means of obtaining the maximum amount of tensile strength, in addition to that obtained by good transverse and longitudinal bonding, to carry the loads to which most walls are subjected, and to provide against the possible lateral movement of any of the constituent parts when the whole is under strain, the question has its sanitary aspect also; and by reference to most of the published engineers' pocketbooks will be found formulæ to find the amount of air in cubic feet which will, in a given time, under certain stated conditions, pass through walls of varied thickness, built of different materials, painted or otherwise. The walls of dwelling houses defectively flushed up are, therefore, admittedly air filters on a very large scale. They are also liable to be receptacles of damp driven in by storms, and induced by the hollow, or partially hollow, state of the brickwork, leading up to disease, and in some instances probably to fatal consequences. It should be the duty of builders to see that a solid brick wall is solid in more than name.

Concrete Footings.

For an ordinary two-story brick dwelling, footings six inches thick formed of good concrete will be found quite sufficient to support the building, particularly if the footings are five or six feet below the ground line, similarly as shown in Fig. 1. Here the footing is formed of six

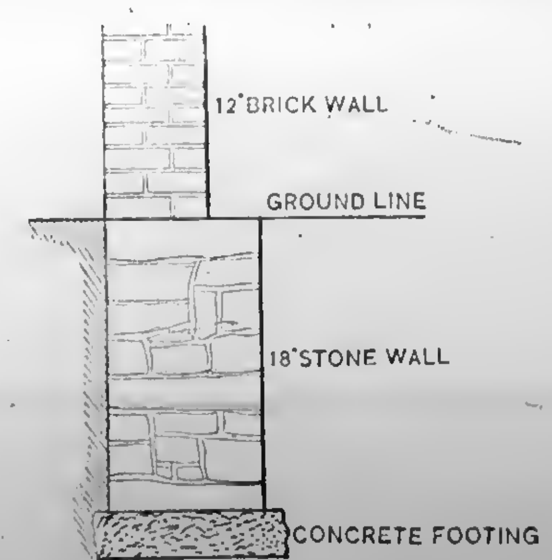


Fig. 1—Foundation.

inches of concrete well rammed in place, and allowed to stand twenty-four hours before the stonework is laid upon it. Concrete for footings should be mixed in the proportion of 1 part of cement to 2 parts of sand and 4 of stone for natural cements, and 1 to 2½ and 5½ for Portland cement. The most satisfactory method of mixing concrete by hand is to first prepare a tight floor of plank, or better still, of sheet iron with the edges turned up about two inches, for mixing the materials on. Upon this platform should first be spread the sand, and upon this the cement. The two should then be thoroughly and immediately mixed by means of shovels or hoes, and the broken stone or aggregates then dumped in on top and the whole worked over dry with shovels, and then worked over again while water is added from a sprinkler on the end of a hose, or from an ordinary watering can. Only as much water should be added as is necessary to cause the cement to completely coat and cause to adhere all the particles of the aggregates. Too much water will lessen the strength of the concrete. The water used should be clean and at about the temperature of 65°. As soon as a batch of concrete is mixed it should be dumped into the trench at once, but in no case should it be thrown more than four feet, for if dumped from a greater height the heavy particles are apt to separate from the lighter ones. The whole layer of 6 inches in thickness may be filled in at once, and where the thickness of the footings is to be more than six inches, two or more layers may be applied to make the required thickness, but the layers should never be more than 6 inches thick in any case. As soon as a square yard of concrete has been deposited, it should be tamped with a wooden rammer weighing about 20 pounds. The tamping should be sufficient to just flush the water to the surface. The concrete should not be permitted to dry too quickly, and when there are to be two or more layers, and if twenty-four hours elapse between depositing the layers, the top of each layer should be sprinkled with water before the next is deposited. When good broad stones are scarce, it will be found much more economical to use concrete footings than footings of stone.

Useful Literature.

Two books recently published contain much that both architect and builder would find to be of great service in the general routine of daily activity. The first of these is entitled "Specifications," and was prepared by W. Frank Bower, architect, and consists of a strongly bound volume covering some 130 pages 9 × 12 inches, exclusive of copious index and reference notes. The object of this work is to aid the architect in preparing specifications for every department of work by calling his attention to every possible item and detail connected with such department. It is also intended to help the builder and contractor to prepare correct estimates, as with this volume before him he can check off every item of labor and material required to complete the work

being estimated upon, making it almost impossible to leave anything unaccounted for in his bill of items. Later on this book may receive further notice at our hands. The second and more important work is "Building Construction and Superintendence," Part 2, covering carpenters' work, by F. E. Kidder, C.E., Ph. D., architect. Part 1, which was devoted to masons' work, bricklayers' and plasterers' work, was well received by the profession, and the volume now under notice is sure to claim equal notice. The plan of the work is something the same as that of the excellent English service published by the Rivingtons of London, in four volumes. Kidder's work, however, is more particularly adapted to American and Canadian usage, and to the materials employed for building purposes in this hemisphere. The work contains upwards of 500 explanatory illustrations, which give to it a useful value that will be appreciated where the architect has failed to give detail drawings for special or unusual work. The volume contains many illustrations of methods for preparing work not found in any other book, some of which are not only new, but are decided improvements over all other usual methods for performing the same work. There are two illustrations on pages 188 and 189 which show an effective method of building skylights, by which the drop caused by condensation is completely avoided. If arrangements can be made with the author who has had the work copyrighted—several of these illustrations and explanations will be reproduced in this journal. This volume is to be followed up with Part 3, which will cover the other building trades.

Window Frame for Frame House.

In making window frames for frame buildings, when the sashes are to be single or double hung, it is not necessary that the back of the frame should be lined in to protect the weights, as the window studs will answer that purpose quite well, as shown at A, Fig. 2. When, however, the window is double as in bays or quarries, the central mullion must be cased in all round, leaving a hollow space for the two sets of weights to operate, as shown at B, Fig. 2. In this example the hanging

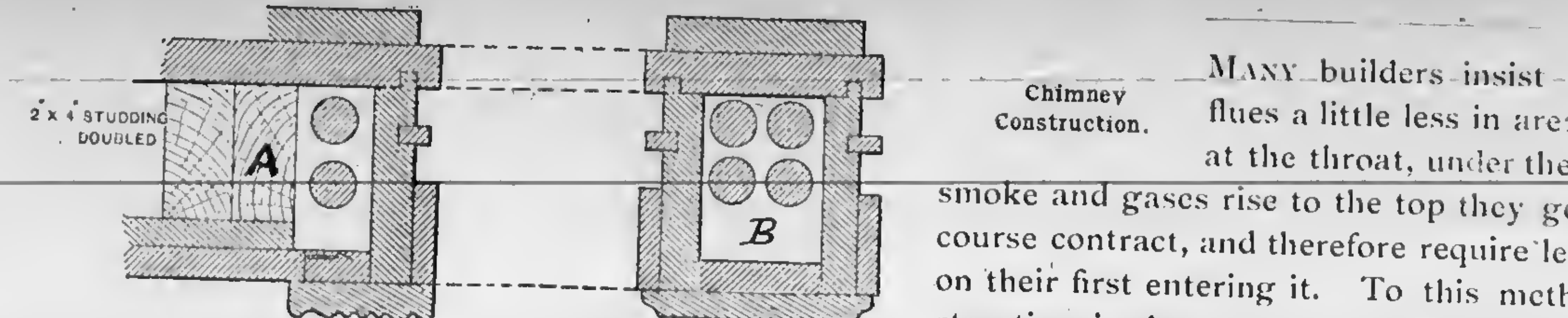


Fig. 2—Section Through Window Frame.
Scale, 1½ Inches to the Foot.

stiles are tongued into the inside grounds, while the outside ground is nailed in between the hanging stiles. The outside ground forms the outside stop for the upper sash, and is left thick enough to receive two thicknesses of siding, or two thicknesses of lathing and a roughcast coat, if the building is to be roughcasted. The outside casing should be thick enough to receive venetian blinds. The manner of finishing the inside of the window is shown in Fig. 2, and in the section shown at Fig. 3 a very good method of constructing and finishing the window sill inside and out is exhibited. The parting beads are let into hanging stile not less than three-eighths of an inch, and they project inside the opening one-half an inch. The sashes, of course, will be provided with bevelled meeting rails, to which should be attached, when finished, one of the many sash locks now in the market. The sill is provided with a drip groove and subsill, and its inner edge is finished with a moulding and tongued apron. The inside casings are flush with the inside edge of the frame, or the stops, as Fig. 2, shows inside stops wide enough to have the joint

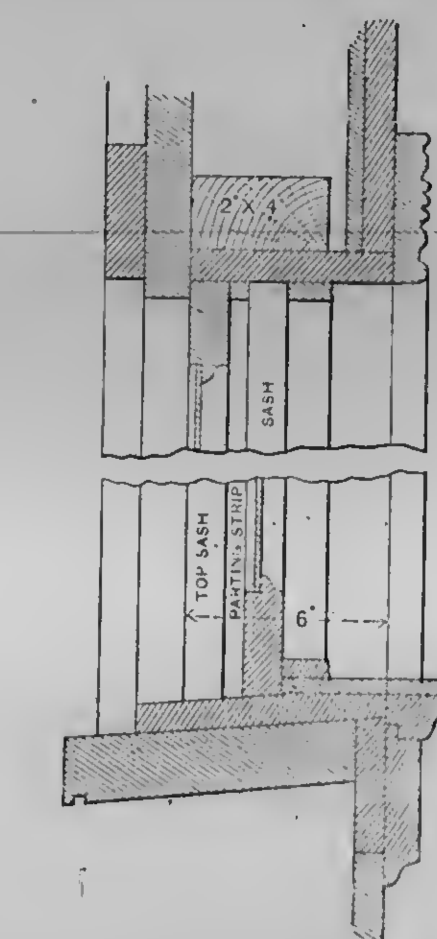


Fig. 3—Detail of Window Section.
Scale, 1½ Inches to the Foot.

covered with casing, while Fig. 3 shows a narrow, beaded, invisible stop. The hanging stiles must, of course, be provided with axle pulleys, and with pockets. Frames should be set perfectly plumb in the wall, face and edge, to insure good free working of the sashes. If set in the wall square and plumb, there will be no dashing of the weights, nor will they require any parting strips in the boxes. The sashes should be fitted "easy," but not so loose and easy as to render them liable to rattle during a wind storm. About 3-32nds of an inch play each way, before the work is painted, is quite enough space to allow for the sashes to work in, if all the other work is well wrought.

Chimney Construction.

Many builders insist in making their flues a little less in area at the top than at the throat, under the idea that as the smoke and gases rise to the top they get cooler, and of course contract, and therefore require less flue area than on their first entering it. To this method of flue construction is due many a "smoky chimney," for, as the smoke and gases ascend, the nearer they get to the top of the flue the slower they travel, and as a consequence, the upper part of the flue gets congested and prevents the lowest strata of smoke from getting up the flue, and the result is that it escapes into the room. Modern experiments have proven that a flue having equal areas top and bottom draws as well, and often better, than one having unequal areas, the smaller being at the top. Better results, however, are obtained by making the flue larger at the top than at the bottom, the best results being obtained by making the flue greater in diameter as it ascends, about half an inch to every twelve feet in height. For instance, a flue 24 feet high, being 9" × 9" at the throat, if built by the rule given above, should be 10" × 10" at the top of the chimney. Flues that are formed of eight-inch glazed drain tiles are generally efficient, and rarely—if ever—

take fire from burning soot, as their smooth interior leaves no restment for soot or dirt. The tiles are placed with the socket joint uppermost, and all joints should be well cemented with neat Portland cement. Where connections are to be made with stove piping, T joints are used, the short end of the pipe connecting with the brickwork and well cemented to the stove-pipe thimble. If the flue leads from a fireplace, the drain tiles may start from the throat just above the fireplace, and the angles may be filled in with hard bricks and cement mortar, in order to prevent any draft from getting current on the outside of the tiles. In forming the throat of the chimney, experience has proven that the best shape is to make the narrowing up at an angle of 45° from the haunches or jambs of the fireplace; and in setting the brickwork to meet this condition, care should be taken to have the ends of the bricks cut to this angle, in order to allow the smoke to pass easily to the throat and up the flue. Where English grates are used this precaution may not be necessary, but for American made grates, or for open fireplaces with and-irons or basket grates, the best results will be found by following the foregoing suggestions. When drain tiles or other like materials are not employed in forming the flue, it should be well "parged" with good mortar on the inside, from bottom to top. The "parging" should be well done, smooth, and of a regular thickness throughout. Besides making it easier for the smoke, etc., to ascend, parging helps very much to make a chimney safer from fire, as the parging fills up every possible faulty joint in the brickwork with mortar, preventing thereby sparks or flames from passing through to the outside of the chimney.

The Size of Bricks.

"IN England the size of bricks is fixed by law." So speaks our esteemed contemporaryy, the CANADIAN ARCHITECT AND BUILDER. Unfortunately, we are not referred to the particular statute enacting the said fixture, so that for the present our clayworkers may go on in the usual style. Our contemporary makes this assumption as a pretext for the Dominion government to take the matter in hand, but we trust that before doing so the promoters of any bill in the Assembly will study the size of British bricks on the spot here. We can show them a few just to whet their appetites. The cry for a brick of uniform size is as old as the "sea serpent," and although of late years manufacturers have for their own and clients' convenience done something in that direction, we seem to be getting no nearer to real uniformity, and probably we never shall. Our friends across the Atlantic will, of course, understand that bricks of a certain name and make will always be of a definite size, and many kinds of bricks may be of one size, either by design or usage. We have got no farther than that. The uniform size recommended for Canada is 8¼ by 4 by 2 inches. It is stated that such sized bricks, either hand-moulded or pressed, will absorb from half to three-quarter pound of water, which, of course, is an absurd observation, unless the actual kind and composition of the brick are known."

"F.R.I.B.A." in British Clayworker.

If "F.R.I.B.A." is right, then "to the dogs" with authorities, and, to some extent, with our own experience. English authorities tell us that: "By the 17th Geo. III., cap. 42, all bricks made for sale were directed, when burnt, to be less than 8½" long, 2½" thick, and 4" wide." (Gwilt.) In "Notes on Building Construction," Vol. III., page 3, 1889 edition, we are told: "Before the year 1839 a duty was paid upon bricks; their size was then practically fixed by Act of Parliament, and it has since remained materially unaltered." Seddon, and other recent authors, practically tell us the same story, so that, if we have erred, we have erred in good English company. In America a number of recognized authorities tell us nearly the same thing. Prof. Ira Baker says, in his "Masonry Construction," page 46: "In England the legal standard size for bricks is 8¾ × 4⅜ × 2¾ inches," etc. Again, Trautwine, in "Engineers' Pocket Book," has it: "The size of bricks in England is fixed by law." Davies, Thursten, Hatfield, and many other competent American and Canadian authorities are in evidence that such an Act exists. The "absurd" observation anent the absorption of water as stated exists only in the imagination of "F.R.I.B.A." In "Notes on Building Construction," Vol. 3, page 110, we are told by this English authority that: "The absorption of average bricks is, however, generally about one-sixth of their weight, and it is only very highly vitrified bricks that take up so little as one-thirteenth or one-fifteenth." We could fill a column with quotations from English authorities on the same lines, but, as we were writing on Canadian, and not English, bricks, it is fair to presume we know more about the subject than it could be possible for "F.R.I.B.A." to know.

NOTE.—The four volumes of "Notes on Building Construction" were prepared by competent authorities to meet the requirements of the syllabus of the science and art department of the Committee of Council on Education, South Kensington, and the work is considered the most reliable and the most complete of its kind in the language. It was published by the Rivingtons, London, Oxford and Cambridge.

SUB CONTRACTORS' AGREEMENT.

IT is announced that at the next convention of the National Association of Builders of the United States, consideration will be given to the preparation of a form of agreement or contract adapted for use between contractors and sub-contractors. No recognized form of agreement for this purpose exists at present. Where it has been sought to make forms of contract intended for use between contractor and owner serve the double purpose, complications have usually resulted. In perhaps the majority of instances the sub-contractor agrees with the contractor to perform certain work in a certain manner and at a stated price, while the general contractor agrees to nothing. It would therefore seem to be a wise step to provide such a form of agreement as proposed, by means of which the rights of all parties would be conserved.

RENOVATING OLD PARQUET FLOORS.—Caustic soda lye, prepared by boiling for ¾ hour with 1 part calcined soda and 1 part slaked lime with 15 parts water in a cast iron pot, is applied to the parquet to be renovated by means of a cloth attached to a stick. After a while rub off the floor with a stiff brush, fine sand and a sufficient quantity of water, to remove the dirt and old wax. Now spread a mixture of concentrated sulphuric acid and water in the proportion of 1 to 8 on the floor. The sulphuric acid, says a German exchange, will remove the particles of dirt and wax which have entered the floor, and enliven the color of the wood. Finally, wax the parquet after it has dried completely and has been washed off with water.

DANGER OF INTERCEPTING TRAPS.*

BY J. W. HUGHES, Montreal.

AT the meeting of our association held last year, a paper from my pen was read, in which the fitting of the intercepting trap in private sewers was condemned, and reasons given for such condemnation. My study and observation during the time that has since elapsed have fully confirmed and strengthened the opinions then set forth, and I am indebted to an able paper by W. M. Watson, in a recent issue of the Canadian Engineer, for results of a series of experiments bearing upon this question, conducted in the city of Cologne, Germany.

The city fathers of that place, finding their by-laws, which were up-to-date and called for an elaborate system of back vents, intercepting traps, fresh air inlets and the usual accompaniments, had not given the expected results, appointed a committee to investigate, and associated with it Herr Maniewski, the leading architect, and Herr Unna, the famed sanitary engineer. These gentlemen went thoroughly into the question, erected complete apparatus with glass pipes for practical demonstration, investigated the condition of existing apparatus in daily use, and, in short, gave the matter that careful and painstaking attention so characteristic of the German. Their report has been published in detail in Nos. 4 and 5 of the Gesundherts Ingenieur for 1898, and been republished in English papers.

I can only give brief extracts taken from W. M. Watson's paper bearing more particularly on the question of the intercepting trap, although the results of the experiments bearing upon the question of back vents are of equal importance, and may be taken up at a future time. It was shown that when a main intercepting trap was used that it not only modified the speed and partly obstructed the flow of sewage, but it prevented any of the air carried down by the soil and other waste water pipes from discharging into the street sewer, where its aerating functions are so necessary to commence the purification of the sewage in the drains and assist in preventing sewer gases generating in the sewers. It was also shown that when the main intercepting trap is omitted there is a superior and self-cleansing flow of sewage, and that large volumes of air pass forward to the street sewer, creating a healthy atmosphere, and circulation of air down the soil pipe through which the fluid is passing and up other soil pipes that are at the time standing idle.

These experiments, especially those that show air is carried down with waste waters, and that the main trap is a dangerous obstruction, fully explain the reasons why those towns that do not use back air pipes, and that extend their soil pipes from the crown of the drains to the highest point of the roof, and which make every rain water leader and waste water pipe to pass to the street sewer without any obstructing trap or sharp angle or interceptions of any kind, are almost free from odors in the houses and streets and free from diseases that can be traced to sewer gas poisoning, while, on the other hand, those cities which have adopted the principle of intercepting traps, back air ventilation pipes, with all their intricate complications, are often quite the reverse; and of disease, a great deal is found among the inhabitants who happen to live in the modern built houses, where the obstruction system has been installed. This is in spite of the fact that the same towns often spend large sums of money in flushing drains and artificially ventilating the street sewers, a thing which is never necessary if the sewers are laid down properly and the straight unobstructed system is adopted.

The city of Cologne has now had enough of the complicated system of plumbing and draining, and, in future, will avoid such expensive luxuries, and again allow their sewage water to leave inhabited premises with as much expedition as possible, and secure all the aeration it can through the journey to the outfall, without making itself a nuisance to the public.

The Cologne investigation has bearing on sewage purification. It will be remembered, more than twenty years ago, Dr. Pasteur, of Paris, and Dr. Warrington, declared that sewage contained the necessary organisms for its own purification.

Dibdin, of London, England, has shown us the way to compel sewage to clean and purify itself. Adney, of Dublin, has proved that domestic sewage requires three times its own bulk in air, regularly and evenly supplied, and distributed to every particle and atom of the sewage to enable the friendly bacteria to destroy the poison, etc., the sewage contains. Lowlock, of Birmingham, has shown us a method of applying the atmospheric air to the sewage, and Reid, of Staffordshire, recommends that all sewage should be purified while fresh, before putrefaction sets in, or sewer gas begins to generate. The fathers of Cologne have shown us, by their experiments, that the sewage will split up with fine threads, and spray and take up atmospheric air in larger quantities even than, Adney tells us, is needed, during the time it is following vertically down the waste pipes.

If all house rain water leaders and waste water pipes were made to form street sewer ventilators, and the water coming down each of the pipes will bring down four times its own bulk of air, which will go a long way towards providing all the air that is needed to do the necessary work of cleaning the sewage, and, in that case, the public sewer will be changed from a gas generating chamber to a receptable for the aeration and purification of sewage and dirty filters.

While under obstructive plumbing by-laws, and private drain arrangement of interception traps, no aeration of the sewers can take place, therefore, putrefaction sets up, and the sewage gas is generated abundantly, which poisons the dwellings and the atmosphere of densely populated towns. The Cologne investigation has demonstrated that most sanitary appliances can, and ought to be, made of glass.

I have quoted so copiously from Mr. Watson's paper, as he has put the matter much better than I could, in confirmation of the objections I gave against the intercepting trap in last year's paper.

* Paper read at the annual meeting of the American Publ. Health Association, held at Ottawa.

As a brick fell from a carrier's hod it knocked down a Spanish flag displayed from a store front below. "That must have been an American brick," said a passer-by. "Yis," said the hod-carrier above, "but it was of Oirish descint."—(Ex.)

The James Smart Mfg. Co., Brockville, Limited, have published their first catalogue of hot water heaters, which contains a description accompanied by numerous illustrations of their "Perfection" horizontal sectional hot water boilers.

The master plumbers of Halifax, Nova Scotia, had a most enjoyable picnic at Heffler's Grounds, Bedford Basin, on Sept. 1st. The important features of the occasion were the series of athletic sports and a bountiful luncheon. The prizes were presented to the winners of the various athletic events by Mr. Geoffrey Morrow.

LIEN LAWS AND CONTRACTING.

The general tendency of business for some years past, says the California Architect and Building News, has been, for a smaller number of individuals, as principals, to do a larger business at a smaller profit. But in the business of contracting to build, the tendency has been, on the coutrary, for a larger number of individuals to do a smaller business, at no profit at all, and often at a loss. This does not often fall upon the contractor, because a large majority have nothing to lose. These conditions have naturally reduced the number of responsible and experienced contractors, many of whom have abandoned the business, while others have been obliged to do so, after sacrificing their legitimate accumulations in the throat-cut purse scramble we call competition.

It is claimed by some sufferers that the prevailing conditions have been the result of a grasping disposition on the part of owners; others again insist that architects are to blame in encouraging incompetent irresponsible bidders. But it must be remembered that the system, if we can call an anarchistic state of things a system, has encouraged incompetent, irresponsible people who have failed at other employments, to adopt the calling of contracting or the profession of architecture; and it is not wonderful if these disturbers of the peace and prosperity of a community should combine to get a living at other peoples' expense.

We believe that no improvement can be hoped for as long as the "Lien Law" is in force. The law relieves everybody connected with the building operation of responsibility, though it is ostensibly intended to fix responsibility and protect innocent parties. In practical operation it enables any impecunious person to get credit and bonds, in order that he may have the handling of the funds to be distributed, often pro rata; in consequence of the impossibility of doing the work at the contract price, or because in the handling, too large a percentage has adhered to his sticky fingers. Sound business principles are always, in the long run, stronger than any statute which conflicts with them, and that attempts to prevent their action. This is what might be expected, because business principles are the result of the experience of the world for ages, and have become a natural force that can be counted on, like the laws of gravity; and any attempt to ignore or defeat it, brings confusion to the man or class who make the attempt. It has been believed that the Lien Law was a necessary protection, first to the journeyman mechanic against the misfortunes or dishonesty of his employer, the contractor; then to the sub-contractor against the same. The business community has, however, discounted the practical working of this elaborate machinery to entrap an unwary owner into paying for twice as much as he receives. A counter machine of bonds, and retention of contract money, together with time limits and other technicalities, was soon set up; and while the expenses and uncertainties of building, for all concerned, have been increased by this legislation and counter legislation, the inevitable net result has been to increase unscrupulous competition, or, rather, to turn the business into a gambling scheme, as devoid of business principle as a bluff in a game of cards.

The fact is that the Lien Law is class legislation, and as such has been pronounced unconstitutional by the supreme courts of more than one state. The Supreme Court of the state of Ohio used this language in a decision in 1897:—"No court can see that it is for the common public welfare that the liberty of contract should be taken away from the owner of a building to enable the seller of materials to collect their value from a man who never purchased them, and who has already fully paid the one with whom he contracted for all that he received."

It will be seen that without a lien law, business would be transacted on the usual basis. Bonds would not be expected, because owners would take only the usual business risks in employing contractors and these risks would be mutual. Hence only responsible parties could engage on either side, and remuneration would be adjusted as real compensation.

STRUCTURAL IRON AND STEEL WORK.*

In setting iron work, great care should be observed to have the top and bottom and the bedding plates of stanchions perfectly level and truly fitting together closely without the need of wedging to bring them to a vertical position, so that the entire of the surfaces shall be bearing the load equally distributed throughout; also that bedding plates of stanchions upon stone pier blocks shall be evenly bedded with Portland cement; also that the bearing surfaces of girders upon cap plates and other supports shall be in full contact all over, without resorting to wedging. Be it observed, that when wedges are used the actual bearing surfaces are reduced to the sum of the areas of only the portions of them which may be in close contact with the upper or under surfaces, whereby greatly intensified stresses are brought upon these parts which may produce danger. The head and foot plates are planed smooth and truly square to the vertical axis of the stanchions. Cast iron, in the absence of stone, may be used for templates to receive the wall ends of girders, beams, and trusses, which should never be laid directly upon brickwork. In the best systems of construction the structural iron or steel framework of large buildings is made quite independent of the stone, brick, terra-cotta, or concrete casings by which the stanchions or columns are surrounded and the intervening bays of light walling, and each successive floor is supported independently by those below it, instead of several upper floors and partitions being carried by the trussed girders of one of the lower floors, usually of the first or second floor. The methods of making joints and connections between stanchion and girder framework are various, and many of them more or less ineffective in attaining rigidity, especially when a fire has taken possession of a building and the girders are liable to be bent or distorted by the heat. Many lives and much property are then often sacrificed because of the insufficiency of the details of the fastening and connection.

Steel (mild) for joists and girders, lintels, bressummers, and other structural purposes, in price and adaptable sections in stock between 3 in. and 16 in. deep, is, considering its greater strength and better properties, generally preferred to wrought iron for the more important classes of structures. Its safe tensile strength is about one-half greater than wrought, and between five and six times greater than that of cast iron. Its compressive strength is three times that of wrought iron, and nearly two-thirds greater than that of cast iron. Steel plates, joists, angles, and channels, which by riveted combinations are made into girders and trusses for floors and trusses for roofs, are now much used. Manufacturers' lists of sections of rolled-iron joists usually give weight per foot run, and the safe load for a variety of spans for which they are in usual practice adapted. It must be observed that these lists differ as much as 25 per cent. for the same section, the smaller loads having five tons per inch of section as the limit of stress, the larger loads taking a greater limit—perhaps over six tons. The safe load on steel joists of similar section may be taken at 40 per cent. greater than for wrought iron, but the deflection in steel joists will for the correspondingly greater load be 40 per cent. greater than the deflection of iron. When the depth of joist is one-twenty-eighth of span, the theoretical deflection will be about ½ in. for wrought iron joist, but for a similar steel joist with 40 per cent. more load it will be about ¾ in.

As rolled beams are often made of inferior iron, the limiting stress of the extreme fibre of the flange should not exceed four tons per square inch of the flange section, especially in the flange in compressive resistance. The limit of fibre stress on steel joists is 6½ tons per square inch of flange section. Steel joists differ in appearance from iron joists in having generally a smoother and more cleanly-rolled surface.

It is more economical to use a deeper section in proportion to span than one twenty-eighth, in order to limit the stress to four, five, or six and a half tons, as the case may be, per square inch of flange section, and avoid undue deflection. Thus, if the depth be from one-fifteenth to one-eighteenth of the span, the deflection in centre should not exceed ⅛ in. in every 5 ft., or one four-hundred-and-eightieth of clear span. This deflection will not crack plaster ceilings.

A usual approximate estimate of safe load for cast-iron tubular columns of height = 12 to 15 diameters, thickness of metal being one twenty-fifth of section area or one-ninth of diameter (per square inch of section area) = 2½ tons. For stanchions of +, with equal arms, 12 to 15 diameters in height (if of unequal arms the least dimension of cross section is taken), two tons.

Eighteen	diameters	in height	1⅘ ton.
Twenty	"	"	1⅗ ton.
Twenty-two	"	"	1⅓ ton.
Twenty-four	"	"	1¼ ton.
Twenty-six	"	"	1⅛ ton.
Twenty-eight	"	"	1 ton.
Thirty	"	"	¾ ton.

A column or stanchion of a height under about 12 diameters will fail by crushing, but when over that one-twelfth ratio of diameter to length or height, it fails by bending. A small deviation of axis, of pressure from axis of column, or a slight bend in casting makes the load act eccentrically, and may reduce strength to one-half or one-third of normal conditions.

The tubular form of column being a more efficient disposition of metal to resist longitudinal pressure than the + or similar open form of section of stanchions, the diameter of the arms or flanges and the thickness of the metal is increased by about one-fourth to one-fifth, so that thereby the metal cross section area becomes increased by about one-eighth to one-fifth, according to increase of height ratio. As castings are sold by weight economy is sought by making wide slot openings, 24 in. to 30 in. long, at intervals in the flanges. This, however, can only properly be done when the metal section, which may be required to fill up a certain width for the sake of appearance or symmetry, is made in excess of statical requirements.

* Extract from "First Principles of Building," by Alex. Black, C. E., published by Biggs & Co., 139-140, Salisbury-court, Fleet street, E C.

HEATING RULES.*

There are approximate rules of the size pipes necessary to warm rooms with hot air, by which furnace men are guided. These rules, coupled with a practical knowledge of the conditions upon which they may be increased in size, or decreased, are as follows, for rooms on the first floor: An eight inch pipe may be used for a room containing one thousand two hundred to one thousand five hundred cubic feet of space, provided the room has not more than one wall exposed, and the pipe not more than six or eight feet from the furnace. If the room has two or three exposed walls a nine-inch pipe would be necessary.

A nine inch pipe for a room containing one thousand five hundred to one thousand eight hundred cubic feet under favorable conditions. The same size room under unfavorable conditions, such as large wall and glass exposure, and long distance from furnace, say twelve or fifteen feet, will require a ten inch pipe.

A ten inch pipe for a room containing about two thousand cubic feet of space with two walls exposed, and hot air pipe not longer than eight or ten feet, but under unfavorable conditions, such as long distance from furnace, and large wall and glass exposure, same size room would require a twelve inch pipe.

These examples are given to show you that it is difficult to lay down a hard and fast rule, that must, under all conditions, be observed for the size pipe required to heat a given space with hot air.

We all know that there are rules given by which the quantities of air passing through a pipe of given size can be figured out. So also can the temperature of the air and its velocity be calculated. A knowledge of these rules and how to figure them out is a good thing to know, but the furnace man who depends upon figuring out the sizes pipes necessary, according to these rules, will get sadly astray, and will probably come to the conclusion that it is not always true that figures do not lie.

I have diverged somewhat to explain why an eight, nine or ten inch pipe will not always heat the same size room, and will now go on to tell you how I would arrive at the sizes necessary, when hot air and hot water heat is to be used in the same room.

The room to be warmed, we will suppose, is fourteen feet wide, twenty-five feet long and ten feet high, containing 3,500 cubic feet of space; it has a bay window and faces the north; it has two walls with outside exposure and is considered a room requiring a large appropriation of heat to warm it in severe cold weather.

If the furnace has large hot air duty to perform in other parts of the house, I would use, in this case a ten inch pipe, and as the hot air register is only about five feet from the furnace, it will warm, under these circumstances, 2,500 cubic feet of the space of the room. I then take the balance of the space, which is 1,000 cubic feet, and for hot water allow one square foot of radiation for each twenty cubic feet of space, which will be fifty square feet. This may seem to you a larger ratio than is usually allowed, but when you consider that this radiator has the cold air of a bay window, with a large cooling surface surrounding it, you will readily understand the wisdom of providing plenty of radiation.

* From a paper on Combination Heating by John Miller, read before the Master Steam Fitters' Association.

MOVING FOUR DOUBLE BRICK FLATS.

We have in the past, says Carpentry and Building, made mention in these columns of a number of interesting pieces of work in connection with the moving of buildings, both large and small, but the latest to attract attention is the moving at one time of four five-story double brick flats, 100 × 75 feet in size. The work was commenced the early part of September, and the houses moved about 6 feet per day, the work requiring nearly 300,000 feet of 12 × 15 inch yellow pine. The buildings are to be moved 75 feet in one direction and 35 feet in another.

The operations are being carried on at Willis avenue and 134th street, New York City, the contractor being Frederick Damm. In doing the work the outside and party foundation walls were torn away at intervals to allow the erecting of cribs, the east and west walls resting on sills which are lapped and stepped to conform to the four levels of the houses. The sills rest on the timbers, which form the 24 cribs and which run completely under the building, east and west. A series of 14 run north and south under the building and interlace with the others to form a complete frame. Owing to the building being about 5 feet lower at the south side than at the north, the supporting frame is stepped off in four great steps, each about 15 inches high, at the north the frame being seven timbers high, while at the south it is only four. After this frame was built, 325 ordinary 4-inch jack screws were placed under it at regular intervals. The buildings were then jacked up and the remaining walls removed. The tracks, 14 in number, were wedged up to the timbers and the jacks removed. The tracks are lubricated with a very greasy soap, which has body enough to keep the sliding timbers from actual contact with each other. The houses are moved by 20 of the jacks, which are set in timbers and huckled to the tracks by chains. They are distributed regularly throughout the frame and are operated simultaneously by signal. The buildings when properly situated will be lowered by jacks a distance of 3 feet, and the new foundation walls will be built up and wedged.

GREEK MASONRY.

What must be observed in the edifices of Greece is the high finish of all the parts. In them the object, which is not intended to be seen, is wrought with as much care as the exterior composition. The junctures of the blocks which form the columns of the Parthenon are so perfect as to require the greatest attention to discover them, and they leave a mark no thicker than the finest thread. In order to attain this extraordinary perfection, the marble was first reduced to its proper shape by a chisel. Afterwards the two pieces were rubbed one upon the other, and sand and water thrown upon the center of friction. The courses, by means of this practice, were placed with incredible precision, and this precision in the shafts of the columns was determined by a square pivot of olive wood. The roses, the plinths, the moldings, the astragals, all the details of the edifice, exhibit the same perfection. The lines of the capitals and the flutings of the columns of the Parthenon are so sharp, that you would be tempted to suppose that the entire column had passed through a lathe. No turners' work in ivory can be more delicate than the Ionic capitals of the Erectheum and the Caryatides of the Pandroseum are perfect models.

EXAMINATION IN SANITARY SCIENCE.

The following papers were given to the candidates in the recent examination in Practical Sanitary Science at the Sanitary Institute:

1. What is the difference between density and specific gravity? How would you determine the density of a piece of coke?

2. State what is meant by the term "latent heat," "radiant heat" and "convection"? How does "convection" differ from "conduction"?

3. Give the composition of a typically good drinking water. State the character and composition you would expect water to have when drawn from the following sources:—(a) chalk, (b) loose sand or gravel, (c) upland surface gathering grounds, (d) rain.

4. Describe the method you would propose to purify a river water intended for public supply, and explain its action.

5. State briefly the precautions to be taken to obtain a stable, dry and healthy building upon the following sub-soils:—(a) stiff clay, (b) sand containing springs.

6. At what depth of flow does a drain discharge the greatest volume? Explain why the velocity of a drain running full is no greater than when it is running half full.

7. What are the advantages and disadvantages of "combined" and "separate" town sewerage systems? and what are the principal considerations that govern a decision as to which system shall be adopted?

8. What is meant by the "flashing point" of petroleum oils? How is this regulated by Act of Parliament? What are the defects in construction of some of the lamps commonly sold that render them dangerous in use?

PLUMBERS' EXAMINATIONS.

The first examinations under the new plumbing bylaw adopted by the City Council of Vancouver, were held recently. The Board of Examiners consisted of the City Engineer, the Plumbing Inspector and Mr. S. A. Wyse. The following persons wrote on the theory of plumbing: H. McQuarrie, W. Blackmore, J. Scott, A. Patton, J. Moran, S. Mortimore, W. Braden, J. Hunt, O. Laursen and C. A. Green.

USEFUL HINTS.

The following formula supplies an ink which will write easily on glass: White lac, 10 parts; Venice turps, 5 parts; turpentine, 15 parts; and powdered indigo, 5 parts. The first three ingredients are mixed and melted, and the indigo is added. The writing is unaffected by water.

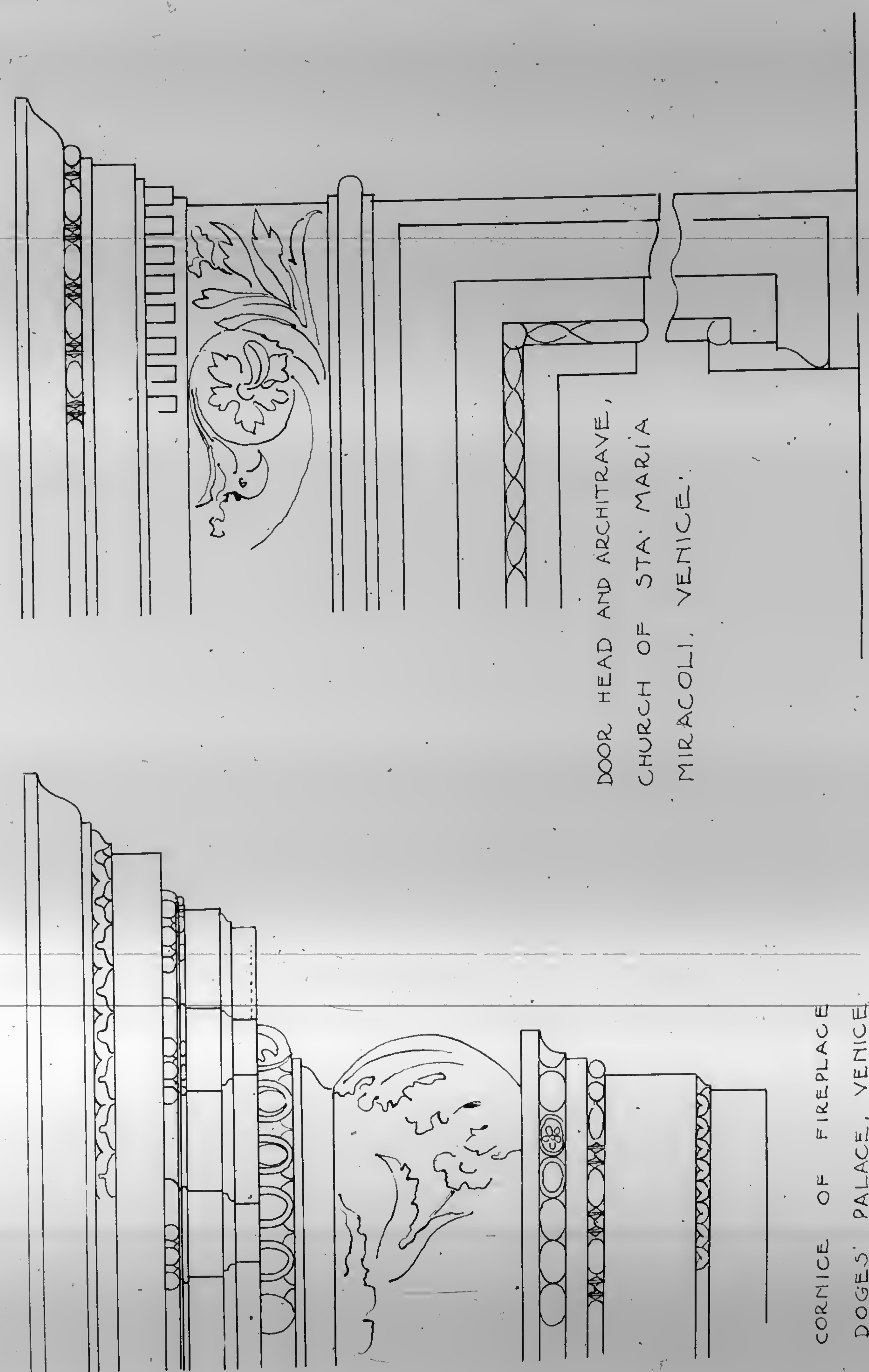
Oil must be used in the first coat of paint for brickwork, for it is the oil which forms the material which binds the pigments together. Certainly brickwork must be perfectly dry when the paint is applied, for otherwise it would soon scale off. If the proper precaution is observed in the work of painting this kind of work there will be little cause for complaint, and the protection added to this kind of work by paint is almost as great as is the protection added to woodwork.

The Art of Bronzing.—Dissolve copper filings in aqua fortis. When the copper has impregnated the acid, pour off the solution, and put into it some pieces of iron or iron filings. The effect of this will be to sink the powder to the bottom of the acid. Pour off the liquor, and wash the water in successive quantities of water. When the powder is dry, it is to be rubbed on the article with a soft cloth; but observe that previously to the application of the bronze powder, a dark blackish sort of green is first to be laid on the article. If you wish the powder to adhere stronger, mix it with gum water, lay it on like paint with a camel's hair brush, or previously trace the parts to be bronzed with gold size, and when nearly dry, rub and powder over it.

REGISTRATION OF PLUMBERS.

A congress of plumbers has been held in Glasgow, when the subject of "Registration" was considered. Mr. W. R. E. Coles, clerk to the Worshipful Company of Plumbers, said the whole fabric of the congress rested on the two broad facts that registration was actually one of the most elementary conditions of organization, inasmuch as there could be no corporate body without it; and the necessity for registration of plumbers had been affirmed by common consent of the plumbing craft throughout the kingdom, the medical profession, the sanitary authorities, architects and others particularly acquainted with the subject, as well as by increased majorities in the House of Commons whenever the Plumbers' Registration Bill had been before Parliament. He pointed out that the necessity for plumbers' registration was first affirmed at a meeting held in London in 1884, and in the fourteen years which had since elapsed the proposition had been approved by public meetings in all the principal centres in England, Ireland, Scotland and Wales. The advantages of registration were primarily that it enabled members to legally combine for the common purpose of building up and maintaining their status, and the public to distinguish those who were qualified and responsible for the discharge of their duties. Indeed, registration was the final condition of legal qualification. Abuses could only be assaulted or met from some vantage ground or stable condition such as a register afforded. The methods of registration adopted for the National Registration of Plumbers had stood the test of fourteen years' experience, and should be continued. He further urged that the necessity for registration should be impressed on the employers and workmen, on the sanitary authorities, on the educational authorities, and particularly on the architects, who were held primarily responsible for the efficiency of all the arrangements of the house built under their direction. He added that the necessity should also be pressed on the attention of Parliament and the public at large.

Important discoveries, says the Plumbers' Review, are often made by accident, and a permanent whitewash was discovered in this way. A few years ago it was decided to whitewash a cellar to make it lighter. For this purpose a suitable quantity of lime was slacked. A workman, who had to carry a vessel of common salt for some other purpose, stumbled over the lime and spilled some of his salt in it. To conceal all traces of his mishap, he stirred in the salt as quickly as possible. The circumstance came out afterwards, and this unintentional addition of salt to the lime excited curiosity. On investigation it was found that not only was the whitewash blameless, but it was as hard as cement and would not wash off.



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Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery.

Prices of Radiators.

THE agreement regulating prices entered into some time ago by the manufacturers of radiators in the United States, terminated in September. Thus far the manufacturing companies appear to have been unable to arrive at a satisfactory understanding on which to base a new agreement. The situation has resulted in a war of competition among the manufacturers, who, finding themselves encumbered with heavy stocks, are slaughtering their goods at almost any figures. It is stated that radiators are being sold in the American market as low as 12½ cents per pound. Unfortunately for Canadian manufacturers, large quantities of American radiators are being shipped into the Dominion, with the result that in this market also, prices have been forced down to a point where little or no margin of profit remains. This condition of affairs is largely due to the heavy duty and freight charges which Canadian manufacturers are required to pay on their raw material. As regards wages, United States manufacturers are said to have the advantage also. Formerly the standard of mechanics' wages was higher in the United States than in Canada, but this condition is now said to be reversed, wages having been forced down in the States by the competition of foreign labor. It is especially unfortunate for Canadian radiator manufacturers that they should be subjected to this unfair competition when a revival of building enterprise is being experienced, and when in consequence there is a brisk demand for their goods.

Province of Quebec Association of Architects.

CONSIDERABLE space is given in this number to an account of the proceedings of the eighth annual convention of the Province of Quebec Association of Architects held in the Association's rooms in Montreal on the 3rd and 4th inst. More than usual interest attached to this meeting, it being the occasion of the complete organization of the Association in accordance with the terms of the Quebec Architects' Act. The first day was entirely devoted to the presentation of reports, addresses by the outgoing and incoming presidents, election of officers for the ensuing year, consideration of amendments to the by-laws, and the annual dinner. The second day was spent in visits to the Architectural

Department of McGill University, ably presided over by Prof. S. H. Capper, the new building of Chemistry and Mining, McGill University, and the picture gallery in the residence of Hon. G. A. Drummond. The attendance at the business sessions numbered between fifty and sixty, the city of Quebec being well represented. A notable and encouraging feature of the meeting was the large attendance of the younger members of the profession, and the keen interest manifested by them in the proceedings. The value of these young men to the Association was suitably recognized by the election of two of their number as members of the Council. The Association has reason to feel proud of the position to which it has attained, one which in some respects is unique. Architecture in the Province of Quebec is now a close profession, and if the powers conferred on the Association are wisely used, as they no doubt will be, good results to the profession and the public may reasonably be expected to follow. Much credit is due those members, French and English, who from the beginning have loyally stood by the interests of the Association. The success which has crowned their efforts should stimulate those who shall be called on to direct the course of the Association under more favorable conditions in the future. With a Department of Architecture already well equipped at McGill University, students have ready at hand the means of qualifying themselves for the practice of the profession in compliance with the requirements of the law, and in the future if not the present they will be grateful for the work that their predecessors have accomplished for the elevation of an ancient and honorable profession.

The Lych Gate. THE correspondence in this number about the suitability of a lych gate for the entrance to a summer residence when put together makes a plea in legal form: (a) The accused did not put up a lych gate. (b) A lych gate is a proper form of gate for a summer residence and the accused did right in putting it up.

It is with the latter proposition that we are concerned. The argument in its favor is stated in Mr. Bousfield's letter when he says: "The skill of an architect is to adapt features and details to present day requirements." This we consider to be a doctrine which does not make for the best art. Architecture is not a finished product, it is a process. On the whole there are few "features" characteristic of former generations that remain in use in the present time and can be imported bodily into modern work; but the process by which they were produced is the same by which good architecture is produced now or ever will be produced. The architect in studying old work should study not how to reproduce a feature but how it came to be produced, as his business is to do, not the same, but likewise. If Mr. Bousfield had said "the skill of an architect is to make features of present day requirements just as the mediaeval designer did out of the requirements of his time," he would surely have stated the matter better.

As regards the lych gate in particular, the question is whether it has any real use. The days for a man to "speak with his adversary in the gate" have passed away with the Judges of Israel; and there is no regular case of the selection of this place for intercourse between friends except when two young people hang over it unable to make up their minds to part; and this is not only no institution which should receive the countenance of a shelter, but such countenance would destroy the fiction that their delay is momentary. For the purpose of receiving friends on a summer evening one would have thought that the verandah is public enough and a degree more hospitable than the gateway. However, if any one wants to sit in his gateway by all means let him have a shelter. Even then it is not likely it would come out of the designer's hands closely resembling a lych gate which shelters only the roadway.

The Champlain Monument at Quebec. THE statue of Champlain at Quebec, of which we have received a photograph, of which a reproduction appears in the illustration pages of this number, has all the marks of being a piece of high-class modern French art. It consists of an admirably proportioned pedestal, with the bronze symbolical group on the face which seems to be customary in French work of this kind, and on top a standing figure of Champlain. It is just such a piece of fresh yet classical design as one would find in the new part of a French town. The general characteristic of the monument is what one might call ornamental liveliness. Champlain, elegantly and without doubt correctly dressed in the fashion of his time, stands on top of a somewhat lofty pedestal; his plumed hat in his hand is slightly waved forward and the opposite foot is slightly drawn back, as if he were about to salute the city of Quebec, towards which his face is turned. Below him Fame blows her long trumpet and spreads her wings over two other figures in bronze; one a female figure with a battlemented crown (perhaps the city of Quebec), the other a naked symbolical boy stepping out of a boat of which the prow projects from the face of the pedestal. All is liveliness—a correct and academical liveliness which satisfies every requirement of municipal decoration. But where in all this is there any essential idea connected with Champlain. If it were not for the prow of the boat we should not know that Champlain was even a navigator, and the boat bears no resemblance to the canoes in which he made his explorations, nor is the naked boy with wings a native of this continent. As for the explorer himself, with his back to the river and his salutations to the city, he seems to have forgotten his former tastes. How much more suitable would have been a more serious figure, looking on the river, like Cortez, another discoverer, as Keats described him—staring at the Pacific, "silent upon a peak in Darien." As for accessories, if the honored dead had passed his life in sitting at a writing desk for the benefit of posterity, with no greater personal adventure than his death, it might be excusable to take refuge in Fame and her trumpet. But Champlain's was a life of adventure and travel. He endured hardships, and underwent adventures which should properly for their own sake be indicated by the accessories of his monument, and which, since they were associated with the primitive peoples and customs of this country, should the more be represented, so that the monument might be made an occasion for recording them in a striking and enduring form. But how are we to expect a foreign architect to be possessed by an idea of this kind? It was not the intention of this notice to strike a blow for native art, but the conclusion is irresistible that the most accomplished French artist is less likely to produce a work filled with the essential poetry of the situation than a native of

the country. And the monument would have historical value in a double sense if it were a piece of native work of the times in which the monument was set up, and filled with true native feeling, instead of being, what is all that can be expected from a foreigner, a piece of graceful generalization, which is about equivalent to saying a piece of graceful claptrap.

THE POETRY OF PLAN.

IT was maintained in a previous article that true architecture is that which expresses the function of a building, and which acquires a character from the mode of construction and from the nature of the material employed. The present generation has made some progress towards the realization of true architecture as an expression of function in respect that it fully recognizes the importance of plan. It seems likely that in future histories of architecture the contribution made by this generation to the development of architecture will be estimated to be scientific planning. It is interesting to note how in works on planning there seems to be no such thing as hostility between practical recommendations and a result which appeals to the imagination as an artistic conception. The immediate result of careful and practical attention to considerations of aspect, prospect and combination is the production of a building which impresses itself as a definite organism; as, in fact, the embodiment of an idea and therefore a poetical creation. This is the fundamental part of the art of architecture.

Names are powerful conveyors of doctrine, and Ruskin made a serious slip when in seeking to establish a groundwork for advocating lavishness for its own sake, in The Lamp of Sacrifice, he confines the name Architecture to that which impresses on a building "characters venerable or beautiful, but otherwise unnecessary." He proposes, in this passage, to deny to battlements or machicolations the title to be considered architectural features "so long as they consist only of an advanced gallery supported on projecting masses, with open intervals beneath for offence. But if these projecting masses be carved beneath into rounded courses, which are useless, and if the headings of the intervals be arched and trefoiled, which is useless, that is Architecture." There is no mistaking the application of the name as he proposes it, but there is also no doubt of his appreciation of a feature like machicolations, which unadorned appeal as much to the painter or the poet as when carved, arched or trefoiled. It is a question of the use of a word, nothing more. It is well that this definition of Architecture has been criticized and will be better when we come to recognize—what Ruskin's critics, who are usually persons who wish to set aside his hatred of the Renaissance, do not—that the first and greatest thing in artistic building is plan, and that therefore this must be included under the name Architecture, taken as Ruskin proposes to take it, as the name of that art which makes building beautiful.

A well planned building is architecture in the largest sense, no matter how unornamented it may be, and it is well to call it so. Conversely, it is well to think of architecture as building. This is not to take the attitude that has been taken—or threatened—by some enthusiasts in England; to sweep away all traditional architectural ornaments and consider the beautifying of each portion of construction without reference to the way in which it has been treated before. These are the Preraphaelites of Architecture, and will no doubt exercise a sound influence; suffering, like Englishmen, for their idea of right, and, in the end, compromising, like Englishmen, for something workable. It is not the intention of this article to deny the use of any, or of the whole body, of traditional forms of detail, but to affirm that they are not architecture any more than bricks are architecture. They are a kind of material which, with bricks and mortar and other materials, furnish the designer with the means of making a whole which is architecture.

It is possible to think of the whole creation without the mind taking note at all of the material of either construction or ornament. On the north-east coast of England, where there is a clear sweep for the wind straight from the Arctic Circle, there is one spot where the cliff by the sea, which already rises so much in that part as to cause the land to slope inwards from the sea, rises suddenly at one point so as to form a good sized hump. This is closely planted with trees. On the landward side at the base of the hump, where the trees stop, lies a long, low, white house, sheltered from the north-east winds and looking south over a lovely, sloping, English lawn, which comes right up to the bow windows of the drawing and dining rooms and extends southward a long way until it merges in a park. How different from this are the Newport "cottages," which look out to the sea and spread themselves in wide, open verandahs to catch all the air they can? Here there are two architectural conceptions, each of which impresses itself upon the mind as such without the consideration of details at all, nor of any features except such as are features in plan; in the one case, lowness to keep well down in shelter and bow windows to invite the sun; in the other case, spreading verandahs to get as much shade as possible without losing the air.

The town house is as reserved in character as the summer residence is expansive. It suits the character of this country that the facade should be attractive. We have no tradition that preserves the idea that a house is a place of safety from attack, so that we do not incline to turn a severely blank wall to the street and expand inwards in courts; but the metaphorical sense in which an Englishman's house is said to be his castle might find better expression than it usually does in the plan of town houses. Because houses of any importance are now seldom built in rows, but have ground enough to be free on all sides, they are too often modelled after a type which is almost as suitable for the country as for the town. All four sides seem sometimes to be thought equally good for windows, in spite of the fact that there is usually either an actual or a possible neighbour within a short distance of one side, and often of two. This might be thought to be an expression of the sociable character of people in this country, but as a matter of fact it is more the exception than the rule that next door neighbours know one another, nor is sociability the right word to apply to an indifference to forming one's toilet in public.

The progress of planning is likely to take more account of the dignity of privacy and result in a greater definiteness of character in the city house which will give it higher rank as an architectural conception.

There have been in the plans of large houses in the United States some evidences of a modified adoption of the French and Italian self contained plan. There are some important houses by well-known men which surround two or three sides of a court, open in its remaining portion to the street and the sun. If practical convenience and comfort is kept in view without effort to produce any distinct resemblance to the European house there can be no doubt that in this direction there is chance of producing an architectural plan.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

COUNCIL OF ARTS AND MANUFACTURES.

By the courtesy of the management I am enabled to present to your readers some particulars regarding the evening drawing and industrial classes at the Montreal School of the Council of Arts and Manufactures of the Province of Quebec, accompanied by illustrations showing specimens of the work of the pupils. There are classes in Freehand Drawing, Architectural and Mechanical Drawing, Boot and Shoe Pattern Making, Lithography, Modelling, Stair Building and Building Construction, and Plumbing. With the exception of the Mechanical Drawing class and the Plumbing class, which meet at 183 Congregation street and in the old St. Gabriel church, respectively, the classes are held in the Monument National, 218 St. Lawrence street.

The Freehand Drawing class is divided into junior and senior sections, the former meeting on Mondays and Thursdays under the direction of Messrs. Joseph St. Charles and J. H. Egan. In this preparatory class the pupil begins by drawing differently shaped blocks, and progresses to more complicated forms. The method of drawing from solids is one which has been recognized by the leading European schools, as best adapted for the instruction of beginners.

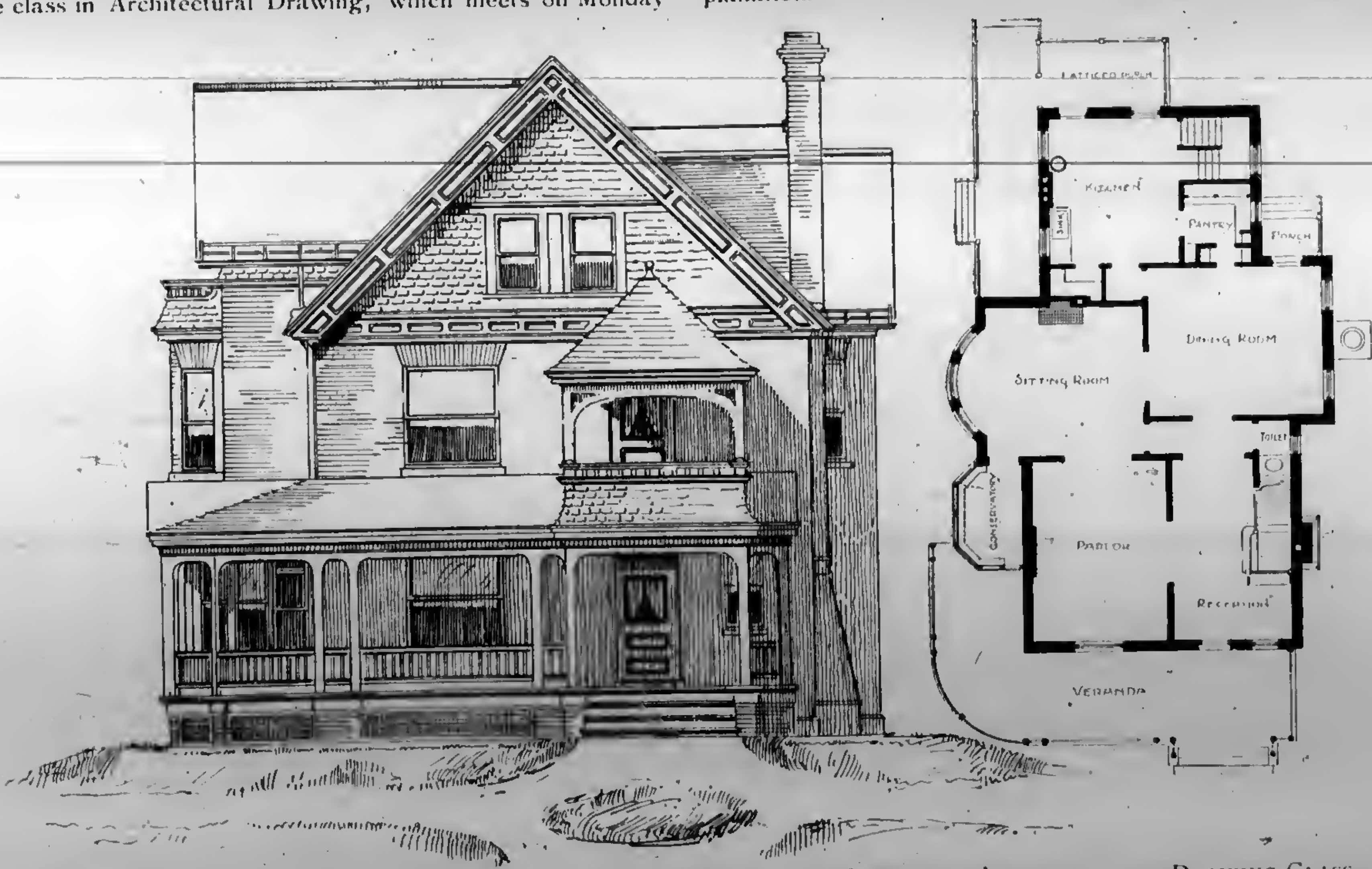
The advanced Freehand Drawing class, which is under the direction of Mr. E. Dyonett, A.R.C.A. meets every Wednesday and Friday. After one year spent in the junior class, students graduate into the advanced class, and are put to drawing parts of the human figure from plaster casts. As progress is made more difficult subjects are presented, until the full length antique figure is reached, after which the student is prepared to draw directly from a living model.

The class in Architectural Drawing, which meets on Monday and Friday evenings, is under the direction of Messrs. Henry J. Peters and George a Monette. Exercises are given in geometry and projection, and instruction in the details of framing, plans and elevations of buildings and the preparation of working drawings.

The class in Stair Building and Building Construction is taught

COUNCIL OF ARTS AND MANUFACTURES, MONTREAL SPECIMEN OF PUPILS' WORK IN STAIR BUILDING CLASS.

by Mr. L. H. Blouin. It meets every Wednesday and Friday evening. Instruction is given in making drawings and tracings of building details, and in methods of construction. Special attention is paid to the important subject of stair building, and explanations in relation to the construction of buildings. The



COUNCIL OF ARTS AND MANUFACTURES, MONTREAL—SPECIMEN OF PUPILS' WORK IN ARCHITECTURAL DRAWING CLASS.

tools and materials required are provided without cost to the students.

The Plumbing class, which, as has been stated, meets in a separate building, has as its instructor Mr. J. A. Peard, and is under the immediate direction of a committee of the Master Plumbers' Association of Montreal. The class has been arranged for apprentices and journeymen engaged in any of the branches of plumbing. The class room is equipped for about 75 pupils, each pupil having a gas furnace for melting solder and a drawer for holding tools. Instruction is given on such subjects as lead bossing, pipe bending, water closets and their fittings, water waste preventors, baths, lavatories and sinks, traps, soil pipes, connection of drains to sewers, ventilation of soil pipes and drains, sizes of pipes, water supply, house cisterns, the use of tools, etc., etc. Questions are placed on the blackboard by the teacher, which the pupils are required to answer in writing. The answers are returned to the pupils after being examined and corrected by the teacher. The pupils are supplied with material free of charge.

COUNCIL OF ARTS AND MANUFACTURES, MONTREAL—INTERIOR VIEW FREEHAND DRAWING AND MODELLING CLASS ROOM.

The Modelling class meets on Wednesday and Friday evening, and is under the instruction of Mr. J. O. Gratton. Pupils are expected to be experienced in freehand drawing, although this requirement is not rigidly adhered to in the case of stone cutters and other pupils connected with the building trades.

Instruction in all the classes is given in both English and French, and is open to male pupils above the age of fifteen.

The work of the classes for 1898-99 began on October 17th. The attendance at most of the classes has increased from year to year, which may be taken as evidence that an educational want of the artizan classes is being satisfactorily supplied.

COUNCIL OF ARTS AND MANUFACTURES, MONTREAL—SPECIMENS OF PUPILS' WORK IN FREEHAND DRAWING CLASS.

NOTES.

Much sympathy is felt with Mr. Lacroix, the City Building Inspector, in consequence of the recent death of his wife.

The geological students of McGill University have recently visited a number of the stone quarries in the vicinity of Montreal and Ottawa under the direction of Professor Adams.

The Municipal Association of Montreal having had under consideration the proposed new city charter, recommend to the council that the by-laws regarding fire escapes should be brought into harmony with the provincial laws on the subject, and that there should be instituted a thorough system of inspection of electrical fittings, wiring, etc., and of gas and gas meters.

The Knights of Labor, at a meeting held in Montreal recently, formulated a petition to the Lieutenant-Governor of Quebec for certain improvements in the educational system of the province. A clause in the petition is as follows: "As the apprenticeship system is rapidly disappearing, to replace it by the only one possible, the better technical education of our youth by means of schools or colleges of applied science."

The Liberal Contractors' Club at a recent meeting elected the following officers: President, Felix Sauvageau, re-elected; First Vice-President, Jos. Brunet, Mayor of Cote des Neiges; Second Vice-President, Godfrol Chapleau; Secretary, G. L. Leveille; Assistant Secretary, N. T. Gagnon; Treasurer, G. W. Crevier, re-elected; Committee—O. Cauchon, H. A. Brosseau, F. Fournier, A. C. St. Amour, L. Z. Lebeuf, O. Lemay, F. Lemoine and Onez Martineau.

The removal of the old Victoria bridge at Montreal is proving to be a very slow and difficult undertaking for the contractors, the Detroit Bridge & Iron Works. The company are employing compressed air for the purpose of cutting the rivets in the old structure. The weight of iron work in the old tubular bridge is upwards of 9,000 tons, and a very large sum will be spent in its removal. An immense shear is now under construction at the Bertram & Sons Iron Works at Dundas, Ont., for the purpose of cutting up the iron work of this old bridge into scrap.

INTERIOR DECORATION.

By W. H. Elliott.

It is difficult for a decorator, as indeed it is for one in any calling, to divest himself of the interest he has in his work sufficiently to stand aside and judge of its importance and place in relation to other things. And yet I am convinced that in many minds there exists such an erroneous conception of the functions of decoration as to justify a more emphatic assertion of its importance than is usually made. I imagine that few even among architects would consent to the proposition that a certain room or hall should be designed mainly for the display of decorative treatment, and yet many of the best known buildings and apartments in the world are of little use except for the display of their decorations and were primarily designed for that purpose. The Sistine Chapel, Loggia of the Vatican, portions of the Louvre and Versailles, the palace at Augsburg and many others suggest themselves. This at once gives dignity to the art. One hears continually of the necessity for making decoration a background for something else, such as pictures, furniture, dresses, people, and in many cases it is desirable, but by no means in all. It would manifestly be impossible to apply a purely decorative treatment to even a moderate proportion of the work undertaken, yet in a modified degree it should be applied to every work of any importance. The ceiling of the room may always be treated purely for decorative effect. Consequently in standard work we find the most elaborate decoration applied there. Nothing interrupts the view, nor is the ceiling so much within the ordinary range of vision as to weary one. But there are rooms in which the walls may be treated almost as elaborately as the ceiling and with satisfactory results. The plea for the pictures is in most houses such a hollow one as not to be worth serious consideration. I have seen the greatest care taken in the selection of a wallpaper for a room both as to pattern and color with reference to the pictures, and afterwards have seen the walls hung with the most inartistic pictures imaginable. One of Morris', or Crane's or Shand Kydd's bold designs would have been infinitely preferable.

I speak of wall papers because they are of necessity the almost universal covering material for walls. Of comparatively modern invention (no trace of them existing previous to the 16th century), no other material has offered itself nearly so satisfactory for transferring design and color to wall surfaces. And the material itself must be completely ignored, the most successful paper being that in which behind the design and color there is no thought of paper. To conceal the material in this case is perfectly legitimate, as it is only a means for transferring the design to the wall. On this account we are free to draw upon a great range of other materials, and while there need be no attempt at deception, the fine qualities of silk, tapestry, leather, &c., are obtained at a cost which makes decoration possible.

As in most other work, simplicity is the keynote of decoration. I do not mean by this weak color or the absence of design. Ordinarily there is neither time nor opportunity for a special planning of each scheme that presents itself for arrangement. So that in most cases a general rule must apply. I have found this to be safest. Allow one color to strongly predominate in the room. The other and smaller mass should be an analogous color. Any other color should be contrasting and small in quantity. Simplicity in color is obtained by this means. Then ornament should not be weakly scattered over the surfaces but massed in parts. Large plain surfaces are always grateful to the eye. Such decoration as the Moorish or Japanese diaper is no exception to this, for their repeated patterns become really plain surfaces. The decorator's task is made much more difficult by the variety of lines he sometimes meets. Among the most trying rooms to treat are those in which the architect, without apparent reason, has made several heights for doors and windows and has placed these openings without regard to the spaces on the walls. This indifference to spacing of the walls and lining of doors and windows gives no end of trouble in the after decoration and destroys the repose of the room. In fact, the only safe road when such conditions exist in a marked degree is to cover the whole wall with one treatment and thus dodge the difficulty. It is well also to avoid inharmonious color schemes in the fixed materials, such as woodwork, tiles, &c., not only with each other, but with the probable after treatment of the room in harmony with its character.

Rich coloring is almost indispensable to successful decoration. Even where light tints are used, plentiful use of gold should take the place of color, for gold itself is very rich and satisfying. As to the use of various colors little can be said in a paper of this nature, but a few suggestions may be of use. Stronger colors may be used on the walls than might be thought possible with good results. The lighter blues are receding and the deeper blues are useful in an over-lighted room. Reds are nearly all assertive, but the strongest reds can be introduced into the color scheme with happy results. The same may be said of the yellows, some of which will bring positive sunshine into a northerly room. Combinations of blues and greens so often seen in the best designing give a very natural coloring to the wall and consequently freshness. The quieter tones of green alone are also very pleasant, but some of the stronger greens which nature uses are impossible in a room where the other outdoor conditions do not exist. As to balance of color, such combinations as we sometimes see of two-thirds of a wall red and the other third blue are always disturbing, and no room so treated can be restful. Greens with certain shades of brown are usually grateful to the eye. Yellow also forms a happy combination with green.

As to patterns it is an axiom with designers that large patterns are most suitable for very large and very small rooms. You can let the medium sized rooms take care of themselves. Of course the uses of the room govern the choice of pattern, and the eye naturally selects that most suitable. But it is a mistake to suppose that a large pattern necessarily reduces the apparent size of a room. When due attention is given to the coloring (avoiding contrasts) the reverse is the case. But in a large room

Council of Arts and Manufactures, Montreal—Specimens of Pupils' Work in Modelling Class.

* Paper read before the Toronto Chapter of Architects.

small patterns should never be used except as practically plain surfaces, forming a background for something more important. A great deal might be said about adapting the decoration to the habits, tastes and more important still, the purses of clients. But this leads into other topics not within the scope of this paper.

ILLUSTRATIONS.

CHAMPLAIN MONUMENT AT QUEBEC.—PAUL CHEVRE, SCULPTOR; MR. CHARDONNELL, ARCHITECT.

ALTERNATIVE DESIGNS FOR A HILLSIDE BUNGALOW TO BE BUILT NEAR VICTORIA, B.C.—R. M. FRIPP, F.R.I.B.A., ARCHITECT.

RESIDENCE OF MR. D. LENNON, WINNIPEG, MAN. C. H. WHEELER, ARCHITECT.

The building is situated on Vennely street, and is a cosy, substantial residence built of local straw-colored brick, with Iron river sandstone dressings. The whole of the ground floor, staircase, halls, etc., are fitted up in quartered oak, ceiling of dining room and entrance hall pannelled in the same wood. The remaining woodwork is formed in British Columbia cedar. The plumbing is very elaborate, and of the best kind, including enamelled baths, sinks, tiled floor and walls to lavatory, etc. Hot water heating and electric fittings. Cost about $6,500.

CABOT MEMORIAL TOWER, BRISTOL, ENGLAND. W. V. GOUGH, ARCHITECT.

The tower, of which an illustration is now given, has been erected to commemorate the sailing of the Cabots from the port of Bristol in the year 1497, resulting in the discovery of America.

It is built on the summit of Brandon Hill, a grass covered eminence rising almost in the middle of the city of Bristol, and in full view of that part of the river Avon from which the Cabots are supposed to have sailed. A beautiful and comprehensive prospect of the city and surrounding country is obtained from the hill and the balconies of the tower. The funds for its erection have been raised by a committee of Bristol citizens, prominent among whom is Mr. W. H. Davies, ex-Mayor of Bristol, chairman, and Messrs. J. W. Arrowsmith and E. G. Clarke, hon. secretaries. The former was one of those deputed by the city of Bristol to visit Canada last year to join in the celebration then held in commemoration of the same event.

The style in which the building has been designed is that of the time of Henry VII., which was considered to be appropriate, as representing the period when the voyages of the Cabots were undertaken.

The tower is built of red Mansfield sandstone from Nottinghamshire, with dressings of Bath freestone. Two stages are provided, each having balconies reached by circular staircases. On each face of the upper stage the balconies have affixed brass engraved plates indicating by arrows the surrounding objects of interest, the situations of the principal British towns and capitals of Europe, and by a prominent arrow giving the approximate direction of the point where Cabot is supposed to have landed on the American continent. The plateau on which the tower stands was artificially formed some time after the Crimean war for the purpose of placing thereon two of the Russian cannon captured in the war, and presented by the government to the city, by whom the site was granted for its present purpose conditionally on the cannon not being disturbed.

On the summit of the spire is a gilded figure representing Commerce. On the four faces of the base are elaborately carved panels containing the arms of the city of Bristol; those of the Society of Merchant Venturers, an ancient and wealthy local corporation; the arms of Venice, the domicile of John Cabot for a considerable part of his life; and those of Henry VII. contemporary with Cabot. On three sides of the base are panels containing bronze tablets, two of which give the dates and descriptions of the laying of the foundation stone and opening respectively, and the other the gift of the Bristol branch of the Peace Society, on which is engraved an inscription setting forth the Society's desire for universal peace, and more especially for lasting friendly relations with the United States of America.

The foundation stone was laid on June 24th, 1897, the 400th anniversary of Cabot's sailing from Bristol, by the Marquis of Dufferin and Ava, who was asked, as a former Governor-General of Canada, to perform the ceremony. It was opened by him, and handed over to the city of Bristol on Sept. 6th, 1898, when were present Lord Strathcona and other eminent Canadians, who attended the meeting of the British Association held at the same time in Bristol.

The architect is Mr. W. V. Gough, of 24 Bridge street, Bristol, whose design was selected in a limited competition between local architects.

Council of Arts and Manufactures, Montreal—Specimens of Pupils' Work in Lithographing Class.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE eighth annual convention of the Province of Quebec Association of Architects was opened, pursuant to announcement, in the rooms of the Association, New York Life Building, Montreal, at 10 o'clock, a.m., on Thursday, the 3rd inst. The President, Mr. J. F. Peachy, of Quebec, presided.

Amongst those present were Messrs. J. S. Archibald, H. L. Auclair, C. Baillarge, A. Blouin, D. R. Brown, C. Brodeur, J. P. Barner, S. H. Capper, J. A. Chausse, A. J. Cooke, W. E. Doran, J. E. Duquette, J. A. Deschamp, H. R. Falbord, S. A. Finley, C. E. Fournier, P. A. Gamelin, J. A. Godin, A. C. Hutchison, M. Hebbronner, J. E. Huot, J. C. A. Heriot, J. A. Karch, A. H. Lapierre, S. Lesage, P. A. Lefort, J. E. Larochelle, J. L. Lafrenier, J. H. Lamoureux, L. Lemieux, Ed. Maxwell, C. Lalond, G. A. Monette, W. S. Maxwell, J. H. McDuff, J. A. Morin, J. Nelson, D. Ouellet, J. Perrault, M. Perrault, J. F. Peachy, A. Raza, H. Stavely, A. M. Sigouin, C. J. Saxe, J. S. Smith, A. Sincennes, A. T. Taylor, J. E. Tanguay, J. O. Turgeon, J. Venne, A. Venne, G. W. Woods, R. Findlay.

After the reading of the names of the qualified members, the Secretary proceeded to read the minutes of the last annual meeting.

Proposed by Mr. J. A. Chausse, seconded by Prof. S. H. Capper, that the minutes be approved. Carried.

The Treasurer then gave in his report, approved by the Auditors, Messrs. W. E. Doran and M. Perrault, as follows :

TREASURER'S REPORT.

Receipts from October 5th, 1897, to October 5th, 1898.

Balance from 1897	$ 110.95
Subscriptions (annual) and examination fees	1270.00
Registration fees	2050.00
Rents	212.50
Total	$3643.45

We, the undersigned Auditors, have examined the books and vouchers, and find the above statement correct.

W. E. DORAN.
M. PERRAULT.

October 19th, 1898.

Disbursements from October 5th, 1897, to October 5th, 1898 :

Salary account	$356.50
Rent paid New York Life Association Co.	200.00
Printing, typewriting, stationary and advertising	129.09
Architectural Journals	16.00
Telephone (2 years)	30.00
Sundries	43.58
Civic taxes	13.58
Examination fees	45.00
Refund of subscriptions to Quebec members	105.00
Expenses of amending charter	630.58
	$1,569.33

Receipts	$3,643.45
Expenditure	1,569.33
Balance on hand	$2,074.12

The report of the Council was then presented :

REPORT OF COUNCIL FOR 1898.

Your Council beg to present the eighth annual report of the work of the Association.

In the last annual report reference was made to the depression in the building trades, and hopes were expressed that soon there would be a more satisfactory condition of things. This hope has only been partially realized. Although trade has improved it still leaves much to be desired, and we have still to echo the hope that the coming year may be a busy and profitable one for the profession.

In one respect, however, this has been the most eventful year since the incorporation of our Association. We have at last obtained what we desired as much for the welfare of the community as our own, but which we failed to obtain at the inception of our Association, namely, the right to prohibit unauthorized and unqualified persons from calling themselves architects.

Your Council was authorized by you at the last annual meeting held in Quebec to take steps to secure this measure together with other amendments, the time being considered by many as opportune, and the result has justified this conclusion.

Your Council lost no time in taking this matter up and it absorbed most of the time devoted to the regular and many special meetings, as will be seen by the following resume :

September 30th, 1897.—Resolution of the general assembly authorizing the Council to study the amendments desired as expressed in the report from Quebec members and to report to a general meeting.

October 5th, 1897. Regular meeting of Council where a special meeting of the committee for and at the general assembly and Council was called for October the 7th.

October 7th, 1897.—The special committee took legal advice as to the possibilities of success and considered ways and means.

October 27th, 1897.—The special committee reported favorably and presented a draft of the procedure to follow as prepared by the lawyer. A special guarantee fund was started to meet the necessary expenditures.

November 3rd, 1897.—General meeting was held conformably to the resolution passed at the annual meeting. A draft of the proposed amendments was approved by the meeting. Upon the advice of the lawyer the official notices were immediately issued in the Official Gazette of Quebec.

November 9th, December 7th, 1897.—Routine work pertaining to the amendments.

January 4th, 1898.—The Council was informed that our lawyer with the committee in Quebec were actively engaged with the representatives in connection with the bill, also that they had been compelled owing to some opposition to admit as architects students having regularly served in an architect's office during four years.

February 8th, 1898.—The bill as assented to by the Lieutenant-Governor was received from the legal adviser of the Association, Hen. Sen. R. Dandurand.

February 15th, 1898.—Our lawyer was consulted as to the best course to follow to carry these amendments contained in this bill into effect.

February 21st, 1898.—A general meeting of the Association was held in conformity with the advice of our lawyer, and elections of a secretary and a treasurer separately were carried out. The amendments to the charter were read and explained and received the approval of the meeting. The notice to be issued in the Official Gazette, as prepared by our lawyer, was also read to the meeting.

March 1st, 1898.—The Council drew up the formula of registration and ordered them to be printed.

April 19th, 1898.—The first applications were considered, and from this date the sittings of the Council have been largely occupied by their consideration.

As actually constituted, the Association numbers one hundred and thirty-eight old and new members included.

The profession is now closed to unqualified practitioners, and only three alternatives are left to outsiders who wish to qualify themselves to practice.

1st. Old members having allowed themselves to be disqualified may re-enter by paying their arrears, subject to the action of the council.

2nd. Members of a well-known sister society who come to settle and practice regularly in the province, by presenting their credentials.

3rd. Those who shall pass the examination prescribed by the charter and by-laws. The arduous task of the material organization is now nearly completed, and the Association can congratulate itself on having secured an authority much coveted by many similar and more influential associations than ours. Not only the interests of the profession, but more especially those of the public, are now protected against incompetent and doubtful practice. The time has now come to put into practice the ideal formulated in the constitution, and aiming to foster the dignity and integrity of the profession, to encourage a better companionship and mutual respect between architects, and last, but not least, to promote the progress of the art, without which all the rest will be useless.

In view of the above-mentioned action, the scheme for a Dominion Institute of Architects has for the present been abandoned.

The Council has with great regret to chronicle the decease of our confrere, Mr. Ovide Mailloux, who was one of the original

charter members and a late member of Council. A resolution of condolence was passed at a special general meeting, which was ordered to be put in the minutes and a copy of same to be sent to the widow and bereaved family.

In accordance with the powers of the Council, Mr. L. A. Montbriand was elected to the vacant position.

The lectures and dinners organized during the winter were followed with the usual success. The lectures were given in the Art Gallery by the kind permission of the Art Association, as in previous years. The lecturers were Prof. F. D. Adams, M.A. Ph. D., who delivered an able lecture on "Pompeii"; Prof. C. H. Calby, M.A. Ph. D., on "Brunelleschi," and Prof. S. H. Capper, on "Ancient Rome." To these gentlemen the hearty thanks of the Association were tendered.

Your Council did not lose sight of the important duty imposed of endeavoring to obtain the sanction of the Lieutenant-Governor to our schedule of charges as provided for in our original charter. It was thought desirable to obtain legal co-operation, and this has been secured. Your Council trusts that this matter also may soon be brought to a satisfactory issue.

The examinations of this year have not been fruitful of success; only one candidate presented himself at the winter examination, but retired on account of ill-health.

Three candidates were examined at the summer session, but all failed to matriculate. It is proposed to make some small changes in the examination curriculum. Your Council and the examiner have considered the matter, and the result will be seen in the proposed amendments to the by-laws, of which notice has been given.

Through the good offices of one of our members, the Council were enabled to exhibit in the rooms of the Association all the valuable documents concerning the Phoebe Hearst competition for the proposed new University of California, and members were all notified of the competition.

Your Council have followed as keenly as possible the vicissitudes of the draft of the new building by-laws for the city of Montreal, which were prepared by the Association and delivered to the City Council a considerable time ago. Steps have been taken from time to time to endeavor to expedite matters. The necessity for a new and vastly improved building by-law for the city of Montreal cannot be doubted, and delay can only be fruitful of harm to the city and citizens. It will be the important and pressing work of the new Council to endeavor to forward the passing of these by-laws in the interest of the public.

Several applications have been received for copies of the Constitution and By-laws, but it was thought better to wait until the new amendments that have been prepared by a special committee, who have devoted much time to their consideration, were sanctioned by the Association, before they were printed and distributed. Moreover, the translation of so important a document requires very special care, and it is suggested that it be put in the hands of a select committee, who shall have power to thoroughly revise the text and render the same consistent and clear.

There have been three special general meetings of the Association during this year, twelve regular meetings of Council and eleven special meetings.

The attendance has been as follows : J. F. Peachy, president, Quebec, 0; A. Raza, 1st vice-president, 25; A. F. Dunlop, 2nd vice-president, 0; Joseph Venne, secretary, 29; E. Maxwell, treasurer, 25; A. T. Taylor, 22; C. Baillarge, Quebec, 0; A. C. Hutchison, 21; James Nelson, 25; O. Mailloux (deceased during the year), 8; Prof. S. H. Capper, 13; L. R. Montbriand (elected to take the seat of O. Mailloux), 6.

J. F. PEACHY, President.
JOS. VENNE, Secretary.

The report of the Quebec Section was then presented:

REPORT OF QUEBEC SECTION.

The undersigned officers for Quebec section, P.Q.A.A., hereby have the honor to submit the annual report of said section for the year 1897-98.

On the 19th of October, 1897, Mr. D. Ouellet was elected President and Mr. Jos. P. Ouellet Secretary of said Quebec section, vice Messrs. Baillarge and Bussieres, whose term of office had expired.

At the same meeting was discussed the question of amendments to be made to the charter of our Association, and the amendments agreed upon were forwarded to the General Council at Montreal.

It having been decided at said general meeting, held at Montreal on the 27th of October, ultimo, to start a list of voluntary subscriptions to cover the necessary expenses required for the passing of said amendments by the Provincial Legislature, the Quebec members of the P.Q.A.A. enlisted, and at the first call of the treasurer of the Association, paid fifty per cent. of their subscriptions.

When the measure was brought before Parliament, the Quebec members joined with their Montreal fellow-architects, and worked hand in hand with them for the common welfare of the Association; and thanks to the well combined efforts of all, and to the justice of our request, the then proposed amendments are now law.

His Worship the Mayor of Quebec having kindly placed at our disposal a room in the city hall, said room has been furnished at our own expense as the place of our future meetings. The photos of the presidents of our Association have been placed in this room, and Mr. Baillarge has collected there quite a number of samples of building materials.

At an assembly held on the 6th of April ultimo, the members of our section, through courtesy, decided to notify all persons who were practising architecture in Quebec (in public offices or elsewhere), without being members of the P.Q.A.A., that they had, consistent with the law, to enlist as members of said Association before the fifth of September now passed, and they have been referred to the secretary of the Association in Montreal for further information on the matter. The above respectfully submitted.

(Signed) D. OUELLET, President Quebec Section.
JOS. P. OUELLET, Secretary.

QUEBEC, 6/10/98.

The election of officers was then proceeded with, the following being the result :—President, A. Raza; 1st Vice-President, Prof. S. H. Capper; 2nd Vice-President, G. E. Tanguay; Secretary, Jos. Venne; Treasurer, W. E. Doran; Councillors—J. F. Peachy, M. Perrault, E. Maxwell, J. S. Archbald, G. A. Monette, A. T. Taylor; Auditors—J. C. A. Heriot and J. A. Chausse.

The retiring President then delivered the following address :

RETIRING PRESIDENT'S ADDRESS.

GENTLEMEN,—As President of this Association I must say that I had very little to do during my term of office, as this is only the third and last meeting at which I have had to preside. However vital questions have been decided in the interests of the Association during this term.

First, this interesting motion of Mr. M. Perrault, seconded by Mr. G. E. Tanguay, aiming at amendments to our charter, so as to strengthen our association and to give it definite powers.

On the recommendation of the Council the proposed amendments to the charter were put in charge of Hon. Senator R. Dandurand, and this friend of our Association willingly gave his best efforts as barrister, and fulfilled his duties of legal adviser with an ability above praise.

Mr. Dandurand ably directed the proceedings of the Council and helped its members in their relation with the provincial legislature, and the result obtained was very important and satisfactory as the greatly increased membership of our Association testifies.

We may now feel that the Province of Quebec Association of Architects is firmly established. It will become the duty of future officers to effectively direct the Association and to act firmly in all questions that shall be referred to its care for the welfare of the Association.

Our Association now has an assured standing, and it is my desire to always continue my connection with it, being proud to be one of the charter members.

The good will which has ever existed between the members of Montreal and Quebec since the formation of the Association is a guarantee for the future. I have no doubt that the Association will maintain its position, if not for ever, at least for a great number of years. Let us remember that our union shall be our strength and our staying power.

Our Association, founded eight years ago, has made yearly progress and gained public consideration. Many young students have passed with distinction the examinations, and are now successful competitors in the field of the profession.

I must acknowledge the splendid reception in the way of interest-meetings and visits, banquets, etc., which we from Quebec have always received in Montreal.

I shall close by thanking the members for the courtesy shown me during my term of office as President. I must specially thank

our worthy Secretary, Mr. Venne ; our relations during my term of office have been of the most cordial character. I must also thank our Treasurer, Mr. Maxwell, for the friendship which he has exhibited towards the Quebec members. Lastly, I thank all members with whom I have had intercourse during my term of of office.

I now leave the Presidency to my confrere, Mr. A. Raza, who, being a resident of this city, will be better able to promote the interests of our Association.

The meeting then adjourned for luncheon.

AFTERNOON SESSION.

The meeting resumed with Mr. A. Raza, the newly-elected President, in the chair.

Several members who were absent in the forenoon presented themselves at the afternoon session, amongst whom were Messrs. J. B. Resther, R. T. Decary and Theo. Daoust.

The President thanked the members for the honor conferred upon him, and further said :

PRESIDENT'S ADDRESS.

GENTLEMEN OF THE ASSOCIATION,—I must thank you for the honor you have conferred upon me by electing me to the presidency of the Province of Quebec Association of Architects, and I beg you to believe that I shall leave nothing undone to foster the purposes of our Association, to increase its beneficent influence in raising the standard of study and assisting in our immediate surroundings the growth of good taste and classical art which we are called upon to cultivate and induce others to appreciate.

Perhaps our profession has not received its due share of appreciation in Canada, as in other countries. France possesses the greatest art institutions in the world, and no artistic reputation is considered achieved unless it has been recognized and sanctioned by the French critics of the Salons, Conservatories, or in the well conducted competitions in sculpture and architecture. But France has always held art in great esteem and honor; it lavished its most generous encouragement upon its own artists, and especially in particular, our art. The Society Centrale des Architectes de France commands the greatest influence and respect. It has been granted the most precious and extraordinary privileges, as every enlightened citizen feels that the honor of the country is centred in its schools of painting, sculpture and architecture.

The aims of our Association—still in its infancy, having only eight years of legal existence—cannot be so ambitious as to pretend to equal those of the most celebrated institutes, as its field of action is necessarily restricted. We cannot hope to revolutionize the art feeling of our clients, who generally have no very adequate ideas of style. The knowledge of architecture is rather restricted, and better ideas may be expected to take root, but gradually. Traditions are lacking in our new community, which is still imbued with ideas rather more utilitarian than artistic.

However, the dawn of greater refinement is coming ; there are unmistakable signs of decided progress, and buildings which were considered masterpieces twenty years ago are altogether depreciated, when judged by better standards of good taste.

I shall willingly admit that there is a tremendous task still left for us, but as a French saying goes, "Paris was not built in one day," and we cannot expect that in a young country like ours, where the fine arts only play second fiddle, that the architect, ill-directed and encouraged by the modest and crude experiences of the public, could have imprinted that good taste, that desire, that enthusiasm of a more ancient civilization.

In America one must build quickly and give large and prompt returns to the client for his investment. The client insists on the greatest amount of rentable space being crowded into his building ; in having ladders, instead of reasonable and commodious staircases.

It too often happens that the greedy speculator shrinks from the idea of consulting an architect, and will call on any stone cutter or wood butcher to draw the rudiments of a plan, venturing on this to build those ugly and ill-proportioned, ill-matured structures, spoiling whole streets—nay, even whole suburbs.

Most certainly the architect cannot bear the whole responsibility of such a state of affairs, but we may inquire where is the remedy for this evil? It is in the intelligent, up-to-date and effective ruling by the civic powers. Good, intelligent, well-directed "city by-laws" will go a long way to improve matters, and we have been persistently memorializing the City Council for that purpose.

Such improved by-laws are of immediate necessity, not only from an artistic point of view, but for the security and comfort of the community, as it often happens that through eccentricities and exaggerations one endangers neighboring properties.

I said that Paris was not built in one day, but we must acknowledge that its citizens did not hesitate to tear down all the older city to rebuild it in less than half a century on more approved and improved notions.

The Paris municipal by-laws are most striogent and absolutely unyielding as to the alignment, height of buildings, and nature of materials.

Our municipal corporations throughout the province have much to be blamed for in this particular, and it is time that persons experienced in building construction, and more especially the architects, shall agitate to obtain improvement.

No building operation should be commenced before a plan shall have been submitted to and approved of by a competent board, where the architect should be represented.

I could lay much stress on this single matter. I could also entertain you on numberless kindred subjects, but I would fear to trespass on your good will. I must conclude by a wish—that is, that the Association be true to its motto : "Magna est veritas et prevalebit." We have striven for the victory of truth and sincerity in our art, and so we shall continue until our efforts shall have been rightly appreciated and approved by our community.

The consideration of amendments to the By-Laws occupied the attention of the meeting for the remainder of the day.

THE ANNUAL DINNER.

The annual association banquet was held in the handsome dining hall of the Hotel Viger, the tables being beautifully decorated for the occasion. The chair was occupied by the newly elected president, Mr. Raza, and the vice-chair by the 1st vice-president, Prof. S. H. Capper. Mayor Prefontaine, Senator Dandaurand, Dean Bovey and Prof. Adams, of McGill University, were among the invited guests. Letters of regret were read by the secretary, Mr. Joseph Venne, from His Honor, Lieutenant-Governor Jette, Premier Marchand, Senator Drummond, C. W. Colby, Professor of History McGill University, R. B. Angus and W. C. McDonald.

After loyalty had been pledged to the Queen and Governor-general, the Mayor proposed in French a toast to "The Honorary Members," which was responded to in English by Senator Dandurand, Dean Bovey and Prof. Adams. Prof. Capper speaking in French and English proposed a toast to "The Sister Associations." In the absence of any member of the Ontario Association of Architects, Mr. C. H. Mortimer, of the CANADIAN ARCHITECT AND BUILDER, responded on behalf of that society.

The proceedings were enlivened by a humorous speech by Mr. W. E. Doran, in which he described the origin and evolution of certain characteristic forms of architecture in Montreal.

Mr Chas. Baillargé, in reply to some remarks by the mayor, pleaded from a humanitarian standpoint for the retention of exterior fire escapes.

The efforts of an excellent orchestra were supplemented by songs from Messrs. Baillarge and Monette.

SECOND DAY.

The closing day of the convention was profitably spent in sight-seeing. In the forenoon the members were shown through the new Chemistry and Mining Building of McGill University, by the architect, Mr. A. T. Taylor, F.R.I.B.A., the equipment being explained to them by Prof. Harrington. They were also privileged to witness experiments in crushing, by Mr. Bell, assistant to Dr. Porter.

At 2 p.m. they viewed the valuable collection of paintings in the residence of the Hon. Geo. A. Drummond. The collection includes examples of the work of Millet, Diaz, Troyon and Corot, also notable examples of the work of classical English painters.

Finally a visit was made to the Architectural Department of McGill University. Prof. S. H. Capper was present to extend a hearty welcome, to act as conductor, and explain the facilities at his disposal for the instruction of those who desire to enter the profession of architecture. The entire top flat of the engineering building is devoted to the use of this department, for which purpose it is excellently adapted, both as regards space and light. There are also lecture rooms on the floor below. The upper flat, devoted to instruction in drawing is divided into two compartments, one for first and second year students, the other for third and fourth year students. The walls are hung with a valuable collection of plaster casts, which exemplify the orders of architecture, and the distinguishing characteristics of each of the styles. There are also a number of cases containing casts of statuary, etc. The architectural casts have as far as possible been classified according to the style and period to which they belong. The lecture room below is equipped with a collection of 2,000 photographs and lantern slides of celebrated buildings, and a powerful lantern by means of which these views can be projected on a screen and their features explained. The pictures thrown on the screen by this lantern are but slightly dimmed by natural light, so that enough daylight can be admitted to the lecture room to allow of the students making notes as the lectures proceed. The lantern slides have been carefully classified and indexed, so as to be immediately available. The photographs are also being catalogued, and when this is done they will be available to the students at all times. A considerable number of valuable reference books are also at the disposal of the students, a room having been specially set apart in the Redpath Library for this purpose. In their first and second year students in this department are given practical instruction in wood turning, bench work and foundry practice. The third and fourth year pupils are given problems in design, being left free to choose the style in which they will work.

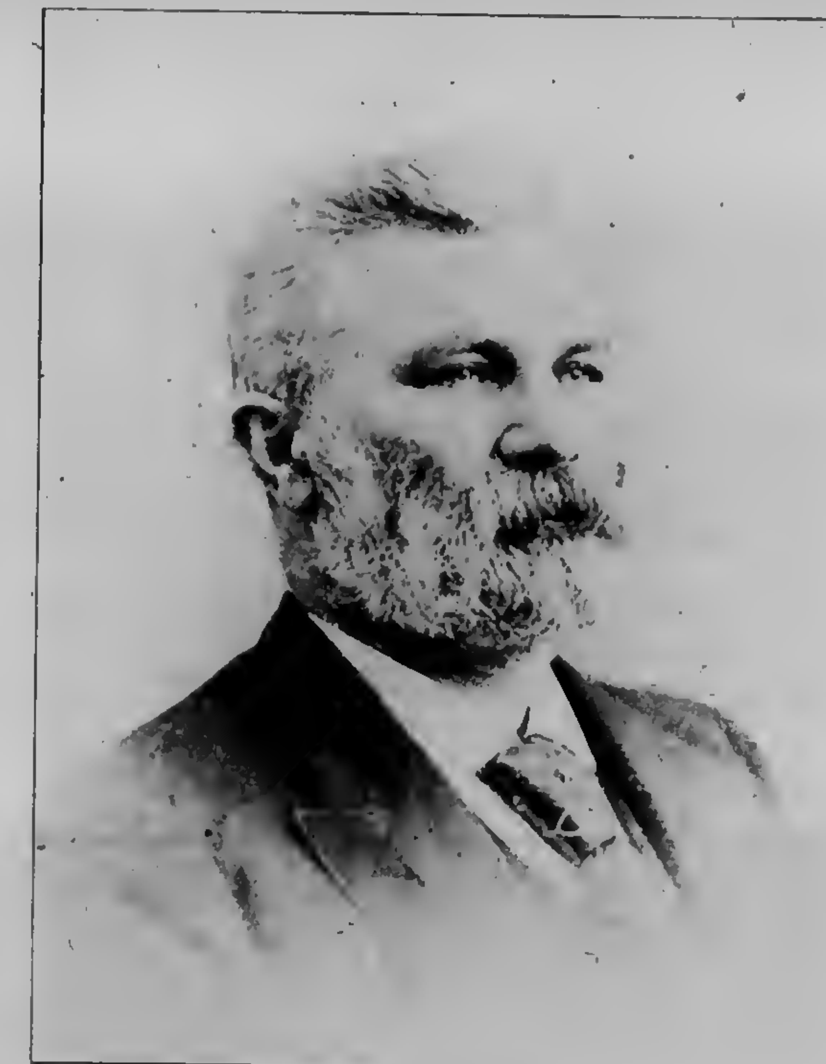
Near Boise City, Idaho, 400 feet below the earth's surface, there is a subterranean lake of hot water of 170 degrees temperature. It has pressure enough to ascend to the top floor of most of the houses, and will be piped to them for heating purposes.

The high oak wainscot of a recently decorated hall has been divided into small square flat panels that have been left without mouldings, and finished to imitate black Flemish oak, without paste filler, so that the grain of the wood is very evident. Above this wainscotting the wall has been hung with an imported paper that gives the effect of Gobelins tapestry, with its subdued though rich coloring. The ceiling has been finished with a beam effect, between which the spaces have been hung with dull red tapestry canvas. The oak floor, which has been filled with a black paste filler and then has been waxed, is kept constantly polished with weighted brushes. The chimney piece of oak, with a carved hood, carries out the Flemish effect, and the fireplace itself is built and faced with very dark bricks, burned until they are almost black, and having a kiln glaze on their surface.

MR. ALPH. RAZA.

THE new President of the Province of Quebec Association of Architects, Mr. Alph. Raza, was born in Montreal on October 7th, 1846. He is a son of the late Mr. H. P. Raza, who was a building contractor. He made complete studies at the Commercial Academy, then under the management of Professor E. W. Archambault ; and began the study of architecture in 1861 under the firm of architects, Messrs. Fowler & Roy, with whom he remained some years, and afterwards with the late Mr. W. T. Thomas. He opened an office in Montreal in 1872. Many public and private buildings were put up under his direction in Montreal and in the province of Quebec.

Mr. Raza has occupied the position of local architect for the Ottawa government for over eighteen years, and also five years for the Quebec government. He is a



MR. ALPH. RAZA.
President Province of Quebec Association of Architects.

member of the French Board of Trade and a Justice of the Peace, and is also one of the original promoters of the Association over which he has now been chosen to preside.

Above the low open book-shelves, finished in forest green oak, the walls in the library of a suburban house have been hung with a dark green burlap, on which an intricate Persian pattern, some two feet deep, has been stenciled as a frieze. The picture moulding has been set in the angle of the ceiling, so that the wires supporting the pictures cross the frieze. The ceiling is covered with a canvas relief material in a small diaper pattern, harmonizing with the frieze design, the colors being dull red for the background and gold for the figures. Green curtains, embroidered in gold, slide on brass rods before the book-shelves, and heavier curtains in the same combination of colors hang at the windows and the door. In the broad bay window is a box seat, heaped with bright colored cushions, that is as attractive looking as it is comfortable. An Oriental rug on the floor gives a touch of warm color to the room, which is heighted by a few choice paintings of Eastern scenes in broad flat frames of gold.

STUDENTS' DEPARTMENT.

C. A. & B. STUDENTS' COMPETITION.

THE publishers of the CANADIAN ARCHITECT AND BUILDER invite architectural students to submit drawings in competition for designs for four ornamental chimneys, for which first, second and third prizes of $15, $5 and one year's subscription to the ARCHITECT AND BUILDER, respectively, are offered.

The chimneys may be of brick, stone or terra cotta, or any or all of these combined.

Competitors are required to show by plans, perspective sketches and details, with or without elevations, the chimneys and sufficient of the plan and arrangement of building to explain the reason for form and position adopted, and to show roofing and other adjacent features it affecting the treatment of the chimneys.

Drawings must be made with pen and perfectly black ink ONLY, on white drawing paper, bristol, or tracing linen, to the size of 15 x 21 inches, and must be so drawn as to give their proper effect when reduced to one-half this size. No brush or color work is permitted.

The competition will close at 5 o'clock p.m. on Thursday, December 1st, 1898. No consideration will be given to drawings which may be received subsequent to that date and hour.

Drawings should be sent by mail or express, addressed to the editor of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto, and marked on the outside "C. A. & B. Competition." All postage and express charges are to be paid by the competitors. Each drawing should be marked only with the non de plume of the author, and should be accompanied by a sealed envelope marked with the same nom de plume and enclosing the full name and address of the competitor. This envelope will remain sealed until the competition is decided.

The merits of the designs which may be submitted in this competition will be decided by a joint committee, composed of officers of the Ontario Association of Architects and the Province of Quebec Association of Architects, whose decision will be final.

The right is reserved to withold one or all of the prizes if, in the opinion of the judges, the designs submitted should be so inferior as to warrant such a proceeding.

Students are requested to read carefully the above conditions, absolute compliance with which will be required of each competitor.

TESTS OF BUILDING STONES.

IN the 17th Geological Report of the State of Indiana, the following directions are given for testing the quality of building stones:

The elasticity of stone may be tested by sawing it into long, slender strips, say two inches square and three feet long, when, if it be quite perceptibly flexible, its elasticity is good. If such a bar be suspended so as to hang free by a string and is struck a light blow with a hammer, its evenness and solidity of fiber will be attested by a clear, sweet metallic note, not unlike that of a fine bell, or that of a well tempered steel bar. As a rule the best stone will break with a direct line of fracture; but it may be conchoidal or otherwise indirect and still be unobjectionable. Parallel lines of cleavage or of stratification are always favorable indications where other features are promising.

Resistance to crushing weight may be pretty safely inferred from solidity of texture and evenness of grain; but it is always necessary before a final acceptance to submit the material to the severest tests of an apparatus for that purpose. This will be described in the proper place.

In examining sandstone, with a view to building purposes, the outcropping, if there be any, should be carefully scanned with a view to discovering what effect long exposure to the atmosphere and the rigors of winter may have had upon it. If the stone has "weathered" badly this will be shown by one or another sign of disintegration or demolition and a talus of fragments and sand will be found formed at or near the base of the outcropping cliff. Often the substance of the rock will show unmistakable evidence of inequalities of structural composition, such as horizontal cavities caused by the weathering out of seams or streaks that, on account of bearing too much iron, have oxidized and crumbled away. Such stone, if used in a building, would prove worthless and, therefore, dangerous. It is often the case, as I have observed during a long experience in civil engineering, that public bridges erected by counties are rendered unsafe by having their piers and abutments constructed of this kind of stone, and that, too, in places where most excellent material lay near at hand, and which a little knowledge of the nature of stone would have pointed out to the superintendent. Too frequently it happens that appearances of the most untrustworthy kind are relied upon where an ignorant person is set to do work which ought to be in charge of a skilled and well-informed engineer.

In judging of the probable durability of limestone, before subjecting it to any test of science, the same observations should be made as in the case of sandstone, with a view to ascertaining its weathering qualities. Any unequal discoloration of the face of the exposed ledge should be scrutinized carefully. Usually these are caused by the presence of iron in the composition of the rock. But limestones are much more injuriously affected by hidden faults of composition than any sandstones, and for this reason they demand a much more careful examination before any extensive quarries are opened. It is often the case that iron in limestone will do no more than discolor the outer surface on exposure to the action of air and rain-water; but even this is a serious defect when the stone is to be used in any structure wherein beauty is a chief object. For the rough masonry of ordinary bridges, and for the hidden foundations of buildings, a cheap and durable stone is what is most wanted, and in these discoloration is not a fatal fault.

An authority on the construction of green-houses says in a recent interesting paper that after the heating and watering, the ventilation of the green-house requires the most careful attention, and should be regarded as a part of the heating system. It should be so managed as to prevent overheating, which is commonly more detrimental than too little.

HAMILTON

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

IN my letter last month I mentioned that improvements were being made to the appearance of the city by the removal of old buildings and the erection on their sites of substantial business blocks. There is plenty of room for improvement yet, but great changes may be expected in the next few years. The two newest blocks are the offices of the Sun Life Insurance Company of Canada and the Spectator Printing Company's building. The Sun Life building is the work of Messrs. Wm. and Walter Stewart, architects, and the Spectator, of Mr. W. G. Witton. The Sun Life is a handsome white stone structure in Italian Rennaisance, and when finished bids fair to be one at any rate of the handsomest buildings in the city. Unfortunately, the site is not rectangular, and as the panelled ceilings follow the angles of the walls, everything is on the skew. A good deal of marble is introduced in dados and architraves of doors; there are panels of beautiful onyx in the dado, and when the decorators get at the plaster caps of the marble columns in the hall, and the moulded friezes and so on, the effect will be no doubt very rich. There is some very good carving in stone inside and out, executed by Mr. F. Turner. The principal contractors are George Webb and L. Medley for the brick and stone work; Dixon, the carpenter's work; Hoodless & Son, the finished hardwood; the marble work has been carried out by Forsythe, of Montreal; Ross Bros. are the painters and decorators, and R. Dow the plasterer, some of whose moulded work is very good indeed.

The Spectator building forms a contrast to the Sun Life, being dark in general color, Connecticut stone and brown bricks. Its internal finish is very plain and simple throughout, there being no attempt at decoration, except, perhaps, in the entrance hall, where a little marble is introduced. George Webb and Press & Sons were the principal contractors. Several other buildings of importance, as factories and warehouses, have been erected this year all about the place, and the opening of the new Waldorf Hotel and the extensive alterations being carried out to the Royal of long standing (under Mr. W. P. Witton) all show that Hamilton is a "live town" and will have an important future. It is probable that an officer will be appointed to look after the interests of the city, much in the way that Mr. Fleming does for Toronto, and it is well for the city that its merchants and other business men are waking up to the fact that their premises put up forty years ago are not suitable for extension of trade, nor do they give an idea of prosperity to the visitor. Insurance companies and banks have taken the lead in the work of improvement, and it is for others to follow suit. The next thing to do is to return to Council the proper kind of pushing business men. The days of sticking in the mud are passing away, and Hamilton may yet deserve its name of "The Ambitious."

I am pleased to learn that a movement is on foot for the organization of a Builders' Exchange for this city on similar lines to the present organizations in Montreal, Toronto and London. It is reported that conditions in Hamilton as regards prices, etc., are not satisfactory, and it is believed that the formation of a Builders' Exchange would be the means of bringing about an improved state of things in the building trade. The success which has attended the formation of exchanges in the Canadian cities above referred to should be a strong encouragement to the builders of Hamilton to organize on similar lines. R. W. G. BOUSFIELD.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

A REJOINDER.

TORONTO, Nov. 3rd, 1898.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—In the last number of your journal is a paragraph in which you proclaim as "ignorant of that knowledge which is a first requisite of his profession," a City Architect of your acquaintance who placed a lych-gate at the entrance to the grounds of a summer residence.

Once there was a dictionary published in which a crab was defined as a "red fish which walked backwards." This was said by a celebrated naturalist to be a very good definition except that it was not red, was not a fish, and didn't walk backwards.

Your criticism of my "lych-gate" is a very good one, only it is not a lych-gate.

Perhaps a journalist who is ignorant of the meaning of the words he uses might also be considered "ignorant of that knowledge which is a first requisite of his profession" but that is merely a technical ignorance for which there may be hope, but for the lack of intelligence which so stigmatizes one who for twenty years has earned a living at his profession there is no hope.

Yours truly,

C. J. GIBSON.

[As Mr. Gibson's name does not appear in the paragraph to which his letter refers, and he denies having used a lych-gate in the position specified, we fail to understand why he should have felt called upon to don his armor and assume the defensive.—EDITOR C. A. AND B.]

HAMILTON, ONT., October 31, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

SIR,—Referring to a leader in the October issue of the C. A. and B.—a lych-gate at the entrance to a summer residence—and why not? I do not know the gate in question, nor do I know the architect of it, though I hope he will let us know his identity. But will you in the meantime please say why you object? I cannot imagine the objection. It is a picturesque feature and serves a useful purpose as a covered seat, and I cannot for the life of me comprehend your stricture. The skill of an architect is to adapt features and details to present day requirements. There may be in the minds of some a superstitious idea that because of its connection with funerals and churchyards it should not be used in connection with a summer residence, but that is all the objection I can see to it, and I entirely fail to see that because he makes use of a lych-gate the architect is ignorant of first requisites, and has made a glaring display of his ignorance. Please let us know upon what the objection is based, and what on earth has caused such an outburst so altogether unreasonable.

Yours truly,

R. W. GAMBIER-BOUSFIELD.

Application has been made for incorporation by the Canadian Plate Glass Co., with head offices at Montreal, and a capital of $10,000.

Mr. Ernest R. Rolph, architect, formerly of Toronto, now holds a position with the C.P.R. at McLeod, Alberta, has recently sustained a severe bereavement by the death of his young wife.

The adaptability of Cabot's Insulating "Quilt," composed cured eel grass, in refrigerator cold storage and ice-house insulation, is clearly explained in a neat circular just to hand from Mr. Samuel Cabot, 70 Kilby street, Boston, Mass., who is the patentee and sole manufacturer of this material.

Application has been made to the Dominion government for the incorporation of the Beaver Portland Cement Company, with headquarters in Montreal, and a capital stock of $150,000. The company seeks power to acquire lands in any part of Canada containing clay, marl and other substances suitable for the manufacture of Portland and other cements, and to carry on business as manufacturers of and dealers in cement, lime, brick, tile, pipe, artificial stone, etc. The names of the applicants are: James Dobson and Charles J. Webb, manufacturers, both of Philadelphia; Ralph Peverley, of New York, manufacturer; Robert T. Hopper, merchant, Robert D. McGibbon, Thomas Chase Casgrain, William Forrest Robinson, book-keeper, all of Montreal, Que.; Robt. D. McGibbon, Robert T. Hopper and William F. Robinson are to be the first or provisional directors of the company.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Building Construction.

LAST month we stated that, if Mr. Kidder, author of "Building Construction and Superintendence," would permit we would present to our readers a few extracts from Vol. 2 of his work which has just been issued. We are pleased to say we have received the permission sought, and further, through the courtesy of his publisher, Wm. T. Comstock, New York, we have secured reproductions of the illustrations, which are presented herewith along with the accompanying text.

Wooden Skylights.

(From page 187.) "LARGE skylights, and those having a gable or hipped roof, can be made much better of galvanized iron or copper than of wood, but small skylights or glazed scuttles, when necessary for lighting an attic room, may be constructed of the latter material when not within the fire district. Such skylights usually consist of a glazed sash through which light is admitted, and the frame on which the sash rests, and to which it is usually hinged. When on a pitched roof the skylight or sash is usually placed parallel with and about eight inches above the roof. The proper method of constructing such a skylight is shown in section in Fig. 167. An opening is first framed in the roof by means

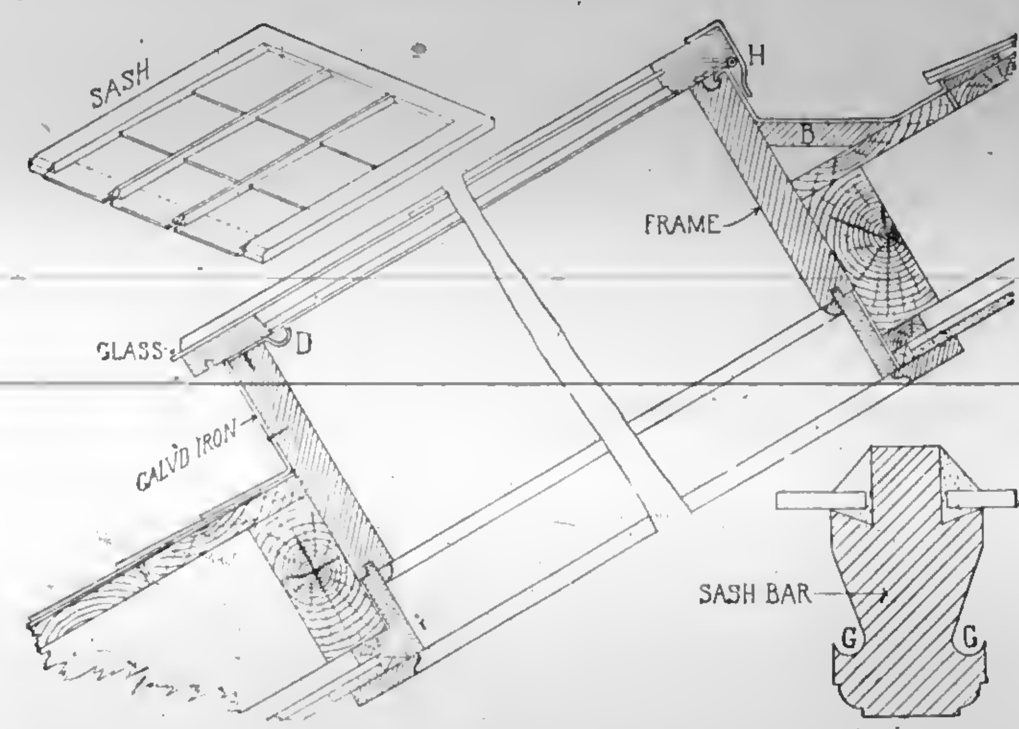


FIG. 167.

of header and trimmer rafters and the frame spiked to the inside of the opening. This frame should be made of 2 inch or 2½ inch plank, 11½ inches wide. Quite often the frame is made of 6 inch or 8 inch rough plank, nailed on top of the roof, the inside flush with the rough opening, and the opening and frame cased with finished boards or ceiling. This method, however, is not as good as the one shown, as the wide planks add to the stiffness of the frame and opening, and prevent the two from separating.

The sash is framed together in the same way as window sash, but should have no cross bars or muntins, and the lower rail should be made so that the glass will pass over it. The rails and stiles should be 2 inches wider than the thickness of the frame, and a ⅞ strip should be nailed to the underside of the stiles, outside of the frame, to protect the joint. For economy in the glass, and also to stiffen the sash, the latter is usually divided into lights about 12 inches wide, by longitudinal muntins or sash bars, as shown in the isometric view. The glass is usually set in putty at the top and sides, but at the bottom the top of the glass is left free to shed water. If the length of the sash is not more than 36 inches each light should be of one piece of glass. When it is greater than this the lights may be glazed with two or more pieces lapped over each other (about 1½ inches), as shown in the section." **** "The most important items in connection with a skylight of the kind shown are the flashing and provision for taking care of the condensation that always forms on the underside of the glass if the room below is warmed or occupied. Behind the top of the frame a gutter should be formed as shown, the board B being cut so as to be the highest at the middle and falling to each side. The lining of this gutter should extend well up on the roof, and should be turned over the edge of the frame into a groove which should be graded to drain off the water at the sides. If the sash is to open it should be hinged at the top and a strip of lead nailed to the top rail, as shown at H, to form a counter flashing. If the sash is stationary a simple fillet may be nailed to the underside of the sash above the frame. The sides of the frame should be flashed with tin (or zinc) shingles, the same as around a chimney, the flashing being carried to the top of the frame.

At the bottom of the frame it is better to use a wide piece of galvanized iron for the flashing, as shown at D. As the water forms on the glass it runs down until it strikes the lower rail and then drops into the gutter. For a small skylight the water in the gutter will evaporate so that it will not overflow, but in large skylights provision should be made for draining off the water by means of a small pipe carried through the frame. On large skylights, also, if made of wood, the sash bars should have a cross section like that shown by the enlarged section, gutters being formed at G to receive water that may run down on the sides of the bars. These gutters should empty into the gutter under the lower rail. Unless some such provision is made for receiving the condensation much trouble will be experienced by water dripping on the floor. The sash is usually fastened by a flat iron bar, provided with holes to slip over a pin,

so as to both secure the window and to hold it open at certain distances. The frame and sash should be made of clear, well-seasoned cypress, white pine or redwood. When a skylight of the style described above is placed on a flat roof it may be made in the same way, only

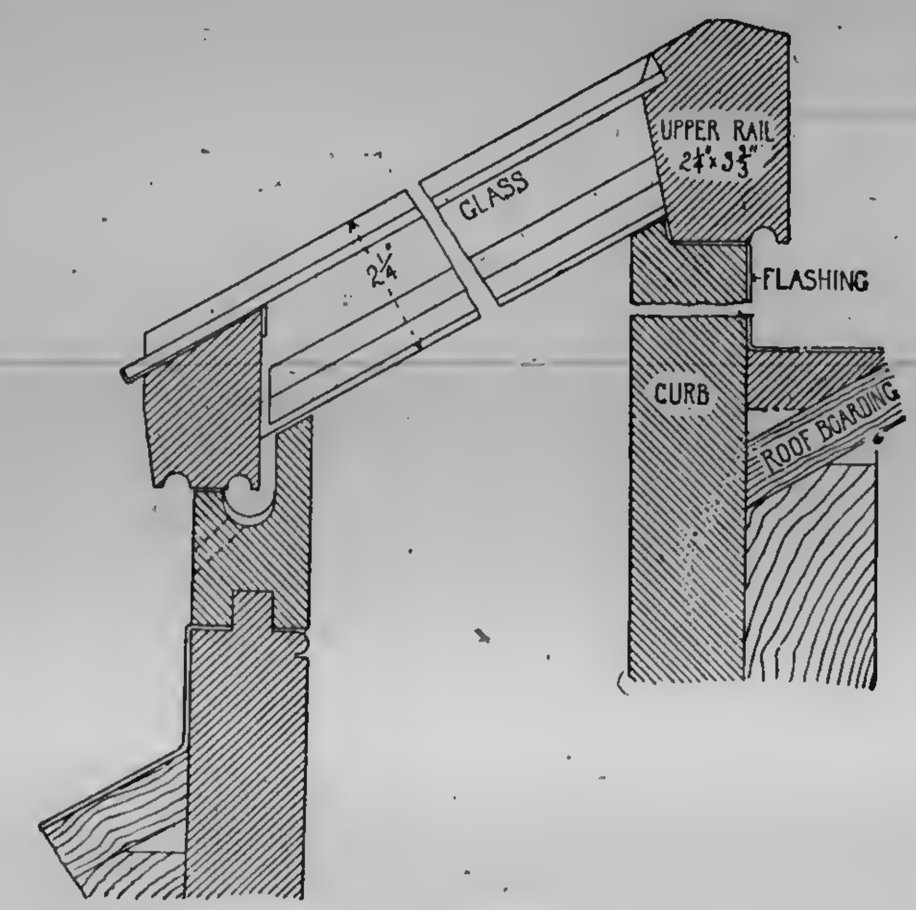


FIG. 167a.

making the frame higher at one end than at the other, so that the sash will have an inclination of about 2 inches to the foot. In flat roofs the frame or curb may be set on top of the roof. Fig. 167a shows another detail, which is in some respects superior for large skylights."

Furring Around Chimneys.

(Page 218.) "IN the Eastern States it is customary to fur around all chimneys with 2 × 3 inch or 2 × 4 inch studding, usually set flatways (except in outside walls) as shown in Fig. 186. The object of this is to form a nailing for

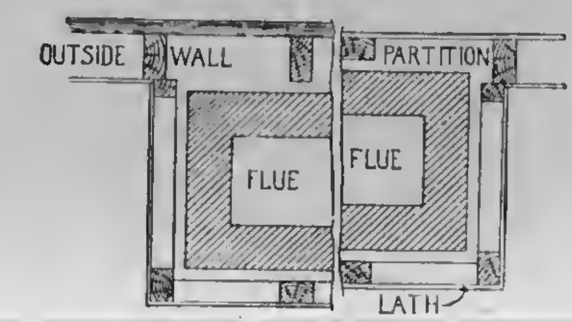


FIG. 186.

the base, chair rail or picture moulding, and also to prevent the cracks that are almost sure to occur when a wooden wall joins a brick one. The studding should be kept at least 1 inch from the brickwork, and should be set plumb, bridged at least once, and the angles made square. If the chimney comes in a brick wall it is also usually furred around in the same way. Fig. 187 shows a way in which a chimney which it is desired to have project on the outside of a frame wall should be

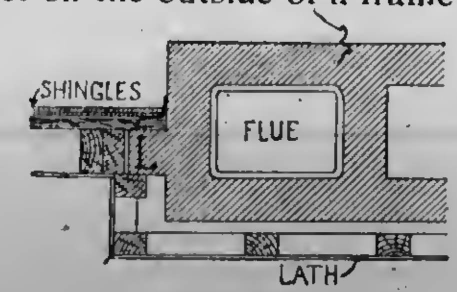


FIG. 187.

built, a four inch lug being carried up on each side of the chimney, as at L, and the boarding and wall covering extending over it. While this construction can easily be made tight, it weakens the wall very much by cutting the joists and plate, and should only be used with caution and not near an angle of the building. When there is a fireplace the furring is set so as to form a breast wide enough to receive the mantel, and an opening is left large enough to receive the facing around the fireplace opening, the facing being usually set flush with the plaster (see Fig. 169a, Part 1). When there is a thimble for a stove pipe a square opening should be framed in the studding opposite the opening, and at least 10 inches larger than the diameter of the pipe. The thimble is generally set so as to project ½ inch from the brickwork, and the back of the recess is plastered directly on the chimney, while the sides are cased with wood."

Conductors Carried Inside the Walls.

(Page 167.) "IT is often desirable and sometimes necessary to place conductors on the inside of the wall. In such cases 4-inch cast iron soil pipe should be used (cast iron does not rust or corrode as badly as wrought iron) with joints caulked and soldered. Especial pains should also be taken to protect the pipes from frost, and if possible they should be perfectly straight and perpendicular. When practicable it is a good idea to fur the outer wall so that the conductor may be kept entirely inside of the wall line; when this is not practicable a recess should be left in the wall for the pipe, but there should never

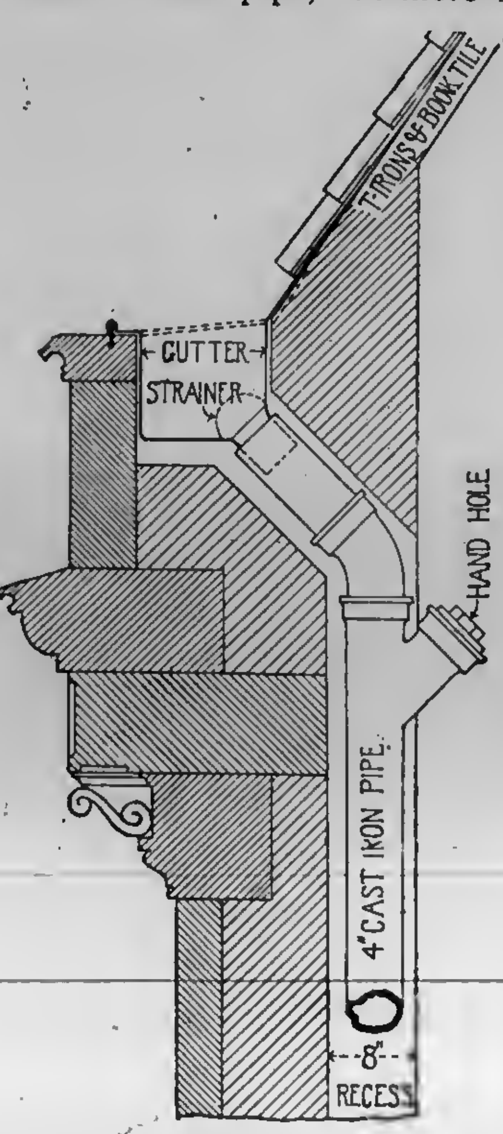


FIG. 147.

be less than 9 inches of wall between the pipes and the outer air, and it is advisable that the space around the pipe be packed with mineral wool. When the building is heated by steam a steam pipe may either be run up beside the conductor or a Y may be placed in the conductor in the cellar and a steam pipe connected with it. The upper end of the conductor should always be protected by a galvanized wire screw, to keep out leaves and other solid substances, and, where practicable, a hand hole should be provided near the top. Fig. 147 shows a detail for an inside conductor in a building designed by Frederick W. Perkins, architect.

The foregoing quotations and illustrations, from the second volume of the work, only convey a very incom-

plete idea of the usefulness of the work to architects, builders and contractors. The volume before us contains upwards of 500 pages, 6×9 inches, and is illustrated by over 500 figured and scaled working diagrams, besides a large number of tables and other useful data.

Some Points on Estimating.

IT is the close figures that makes the most reliable estimate, and where contracts generally prove satisfactory all round. Every inch of material and every minute of time should be counted, and the figures should always avoid that dangerous risk "that's near enough." There is no such thing in successful estimating as "near enough;" "exactly right" is what is required, then you know what you are doing. Remember always, that it costs more to do the same work in an upper story than it does in a lower one. Doors, same size, equal finish, same time, and furnished with same style of hardware, cost from one to three per cent. more to finish when in an upper story. The higher up, the higher the cost, and what is true of doors is also true of every other kind of work. It is utterly impossible to tell the exact cost of one part of a building by comparing it with the cost of a similar piece of work. You may get near it, but you should not be satisfied with that. It pays the estimator to estimate on everything and to be exact in every estimate. Avoid accepting figures that are not your own, and, above all, put no trust in estimates of cost as given in architectural books and journals, unless such estimates are itemized and you have gone over the figures yourself. Many a young builder has lost his reputation—and his money—by taking it for granted that a certain house, illustrated, can be finished complete for the sum stated in book or journal. These are traps and snares for the unwary avoid them. Estimates obtained from an architect's office are generally correct so far as quantities are concerned, but are generally woefully lacking in the time, labor and prices. There are so many things the architect wots not of, such as scaffolding, handling material, and other things, that render his figures doubtful, that it is always better to make your own. It is just as bad to overdo an estimate as to underdo it, for in one case you lose your work and in the other your money, and in these days of close yea, savage competition, it is the man who figures everything, and figures exact, that takes the work. If you cannot estimate with confidence in your own ability, or have no trusted workman who can estimate, you had better let "contracting" alone, or you will find yourself in deep water before you are aware of it.

Wood-Carving.

EVERY carpenter desiring to advance and better his condition should provide himself with a few wood-carving tools, and should occasionally practice a little at the wood-carver's art. There have been great changes in the style and character of carpenter and joiner work during the last twenty-five years in this country. What was considered fairly elaborate work then would scarcely be tolerated now, and the substitution of hardwood finish for pine and other soft woods renders it absolutely necessary that a workman, to be held in any esteem, should have some knowledge of carving. He need not be an expert, but he ought to be able to carve an architrave block, a rosette, or a newel post, ornament the face of a drawer, or execute any little carved work that may be necessary about hardwood finish in an ordinary house. The price of a small "kit" of carving tools, consisting of, say, six pieces, need not be more than $1.50, and a few hours' practice of their use would enable any clever workman to execute plain carving with a considerable amount of success. Incised work, which is a simple matter, and which is performed with a V tool only, is much in vogue just now, and is very effective for some purposes when properly done and artistically designed. In fitting up country or village shops, it is astonishing how attractive the front of the shelving, counters, cornice and drawers may be made by a judicious introduction of a little carved and incised work here and there. Particularly is this true of drug stores and of barber shops having any pretensions. A little carving, too, may be applied to bars and bar counters, in the better class hotels and saloons, to their improvement. Indeed, there are hundreds of opportunities where a little plain carving will greatly enrich the work and bring credit and profit to the workman. At any rate, it will always be a source of pleasure to the workman to know he is able to perform a bit of carving should he ever be called upon to do it; and, when an architect is confident he can get such work done, he will be apt to introduce in his designs a little of it at first, and more and more as the public become educated up to it. It is a lamentable fact that modern domestic architecture in this country is almost entirely devoid of carving, while in the older countries of Europe the most humble dwelling is often adorned with tasteful carvings to some extent. In Switzerland carvings and perforated woodwork are everywhere, in castle and chalet, and the lowliest cot often contains gems of fine carving.

QUESTIONS AND ANSWERS.

"J. C.," Kingston, Ont., writes: "What is the best material to use to fill up the joints in a maple floor that has been laid for some five or six years and has shrunk away? It is a hospital floor and has to be waxed, and the filling of cracks ought to be same color as present floor, so as not to be conspicuous.

ANSWER.—(1) If the floor is badly shrunk, it should be taken up and relaid. (2) If taking up is impossible, and joints are more than one-sixteenth inch open, fill with white lead putty, and color to suit. In a week the joints will be as hard as the flooring. (3) If joints are not more than one-sixteenth inch open or less, clean out well with pointed tool and hair brush, coat over the whole floor with Wheeler's patent wood-filler, or other reliable wood-filler, seeing that the joints are filled up flush. Let stand about an hour, then rub (across the grain) with excelsior, making sure the joints are well filled. The rubbing must be done thoroughly, and continued, until the work seems dry. This done, let the floor stand for 24 hours, then—for a hospital—shellac the floor, and you will have a smooth, unbroken floor. Before applying the wood-filler, thin it down with spirits of turpentine to a thick cream consistency; apply with brush.

The Gurney-Tilden Company, Limited, of Hamilton, Ont., have opened a branch warehouse at 134 Bay street, Toronto, where a stock of their radiators, boilers and stoves will be kept constantly on hand for the convenience of architects, plumbers, etc. This branch will be in charge of Mr. George H. Taylor.

A nice stain for light walnut, or pine or other light woods, can be made by dissolving permanganate of potash in water, say one drachm to three ounces of water, or in proportion to give the right shade. Go over the wood twice, wait five minutes, then wash the stain with clear water, let it dry, and finish as you like. For dark walnut mix the stain darker by using less water, or put on more coats. Pencil in the dark veins with acetate of iron.

CAUSES OF FAILURE OF BRICKWORK.

A WELL known British authority, writing on this subject, says: "It would be tedious to refer to particular cases of failure of brickwork, directly and indirectly, in walls and piers. They may generally be roughly summarised under the following five categories: (1) Failures may have arisen from exaggerated ideas of the loads which may be safely imposed upon brickwork as derived from single-brick tests. (2) From want of discrimination between the tested strength of single bricks or brick cubes, and that of brickwork, and likewise between the difference in strength of different qualities and bonds of brickwork construction. (3) From want of appreciation of the weakening effect (a) of unhomogeneous construction, (b) of high ratios of height to thickness of walls, pilasters, imposts, and piers, and (c) of the weakening influence of wet weather during building upon the brickwork, and its perpetuating soft interior mortar used in levelling up the bed-joints throughout the courses, especially when bats and brick refuse form a hearting. (4) Want of recognition of all the external sources of abnormal and eccentric loads and strains, as from floor joists, floor girders, bearing upon one side, or upon two adjacent sides, or even upon opposite sides, but unequally, owing to unequal opposite loads; from unequal spans, or unequal unit loads upon equal spans, or thrusts from roof trusses, wind force, or arising from the nature of the usage of the building, as in miscellaneous storage of warehouse goods, disturbing energy of oscillation and vibration of heavy running machinery, engines, machine tools, etc. (5) Want of recognition of associations of contributory weaknesses, as damp foundations not being reinforced by strong brickwork, but instead the weakness of the brickwork thereby becomes weaker still when not reinforced by strong foundations; wrong use of the inverted arch in foundations.

The greatly reduced strength of brickwork as compared with that of the component single bricks depends on the difference of the conditions prevailing in each case. These differing conditions may be distinguished as the "critical conditions," and they may be summarised thus under transverse tension and shearing stresses peculiar to brickwork, which may be characterised as blockwork i.e., composed of independent individual blocks cemented together—as distinguished from work of a homogeneous nature, such as concrete work. The critical conditions are caused as follows:

(a) By uneveness of the supporting bed-joint area, which is broken up by prominences and vacuities of the cross-joints and of the filling spaces, which are caused by the exigencies of the lateral and cross-bonding arrangements of the bricks and joints in the adjacent courses of walling.

(b) By these vacuities being more or less filled, and frequently only partially filled, with compressible mortar, whereby the bricks are supported, really, only by a few isolated points and areas of the bedding joint surface. Those isolated areas are unevenly and variously distributed at different points, and may aggregate only a small fraction of the whole bed-joint area. When these supporting points are accumulated to a larger or less extent on one side than on the others of the cross-section, the conditions of eccentric loading are set up as effectually as if the load were placed eccentric to the axis of the pier. In such a manner the successive stages of the destructive process culminating in ultimate failure of brickwork may be traced with variations in details depending on the special conditions involved in any particular case. It may be assumed as a general condition that incipient defects of materials or of the mode of structure cause weakness of brickwork.

The initial weakness in brickwork is always local, and in the case of piers the local weakness is very rarely equal all round the section. Such local weakness is equivalent to eccentric loading, which reduces the strength of a pier by one-half to two-thirds of the normal eccentric loading strength.

A chain is said to be no stronger than its weakest link, so likewise in masonry the bed-joint mortar forms the link which has independent action in coursed masonry. Its main resisting function is that of compression. The destructive yielding of mortar in coursed masonry is not reinforced appreciably by its cohesive and adhesive properties, as these are inferior elements in lime mortar. The strength of brickwork therefore bears a close relation to the compressive resistance of the mortar in which it is laid. Portland or hydraulic cement gives larger results in proportion to its increased strength compared with lime mortar.

Viewing these hints of the details of a destructive process may help to illustrate important points of difference in stress action, whereby the compressive strength only of single bricks gives exaggerated data inapplicable directly to the strength of brickwork. The principal exaggeration of the results of testing of single bricks is due to the avoidance of the "critical conditions" of failure by tension and shearing. These critical conditions are not allowed any place in the details of testing single bricks, or in their stead half bricks, or fractional brick cubes, by the customary methods of testing."

PERSONAL.

Mr. Samuel Gooding, a retired builder and respected citizen of Toronto, died suddenly in that city a few days ago.

Mr. Hugh Ryan, the well known contractor of Toronto, who has recently returned from the Crow's Nest Pass, is dangerously ill from Bright's disease.

Mr. James Brown, a well known contractor at Ottawa, died in that city a few days ago. The late Mr. Brown had been a resident of Ottawa for 40 years.

Mr. William Tye, chief engineer of construction, Canadian Pacific Railway, was united in marriage on October 12th, at St. Peter's Cathedral, London, Ont., to Mabel, only daughter of E. Maloney of that city.

The new drill hall at Halifax, for which Mr. John E. Askwith, of Ottawa, is the contractor, is nearing completion. The building is 315×150 feet, with a drill space of 250×110 feet. Massive steel girders and heavy steel sheeting have been largely employed in its construction. The cost of the building will be about $275,000.

Mr. Collingwood Schrieber, chief engineer of the Department of Public Works, has notified the contractors for the interprovincial bridge across the Ottawa river at Ottawa that in the construction of the piers opportunity must be afforded him of inspecting the concrete after it has properly set. This precaution is insisted upon in view of the height of the piers and of the recent accident at Cornwall.

The Ottawa Art Association commenced its work for the present season on the 1st inst. under most favorable conditions. Following are the officers of the association for 1898 and 1899: Honorary president, Sir Wilfrid Laurier; president, Rev. W. T. Herridge; first vice-president, Mr. David Maclaren; second vice-president, Mr. John Manuel; treasurer, Major Gourdeau; secretary, Mr. Frank Beard; executive committee, Hon. J. I. Tarte, Hon. R. R. Dobell, Hon. E. H. Bronson, Messrs. C. Ross, J. F. Taylor, F. Checkley, John Christie, F. A. Dixon, M. C. Edey, A. W. Fleck, A. Frechette, Warren Green, Geo. L. Orme, Warren Y. Soper and John W. H. Watts.

SIZE ON OLD WALLS.

A SUBSCRIBER of the Painters' Magazine asks why smooth, white coated plastered walls that have remained so for a number of years, that have been frequently washed with soap and water, will form a coating (by reason of this special washing) from which regular glue size will not prevent wall paper from cracking and peeling off. Is there any size which will hold paper on such walls?

This, says our contemporary, is not by any means an every-day question. The fact is that in our experience we never came across such a situation. Our answer will have to be in the main a theoretical one. The conditions are somewhat peculiar, for the reason that soap will not so affect all walls. If the white coat, or smooth coat of plaster, be mostly plaster of Paris, as is usually the case, this condition would not come about, no matter how much washing the walls had with soap and water.

On the contrary, if the smooth coat was composed to a great extent of "fat lime," we can, perhaps, see how this condition would arise. By the repeated applications of soap and water, a chemical action might take place, between the excess of lime in the plaster and the soap, forming a lime soap or sort of calcium oleate, which is absolutely impervious to water. In time this would become very hard and glassy, and, we think, would be very likely to throw off any paste or water size, whether made with glue or any like substance. It is possible that the paper hanger's "hard oil"—gloss oil—would hold to that surface. We suggest two modes of treatment. Wash the affected walls with a water containing a small percentage of sulphuric acid, not much, just about enough to well sour the water. Give them a good washing, and the next day wash off with clean water, and proceed with a common glue size, or, we doubt not, but paste will hold, without sizing.

The other course of treatment would be to go over the walls with a very coarse sand-paper or any like material; in that way slightly scratching or harrowing up the surface, to allow for a good anchorage for the size, paste or hard oil which would afterward be applied. The latter course is the easier and quicker gotten through with, and I think it would answer. The washing of the walls with acid would certainly answer the purpose. I wish the questioner would advise us as to his results.

A master painter of wide experience, to whom the question was submitted, gives the following answer: Plastered walls that have for a number of years been frequently washed with soap and water offer a naturally repellent surface for the reception of wall paper when simply treated with regular glue size. The accumulated caustic chemical properties upon the walls attack and work out through a regular glue size of ordinary thinness, and the disruption of the size carries with it the cracking and peeling complained of. A great deal of importance should be attached to making and applying the size upon walls, and most emphatically is this true in the case of walls calling for a special treatment. For a size intended to cover such walls as described by our "Subscriber," take ¾ lb. of white flake glue, the glossy semi-transparent kind, and put it to soak over night in enough water to nicely cover it, making due allowance for the water which the glue will take up. In the morning bring it just to the boiling point, when it should be dissolved. Then take 4 ounces of pulverized alum and dissolve in a quart of boiling water. To 2 gallons of clean soft water now add the alum water and the glue. The alum will harden the size, and act as a "fixer," holding in sturdy check any disturbing substances which the alkali-smeared and saturated wall may contain.

From Subscriber's description we are led to infer that the walls are in a good state of preservation. Otherwise we would advise making the size of a stronger percentage of both glue and alum, as for example: One pound best white glue, first soaked in cold water and then dissolved in hot, as previously described; three-fourths pound of pulverized alum, dissolved in quart of boiling water. After mixing the glue and alum water, add cold water to make six quarts of size.

The cracking and peeling of wall paper is not always due to negative or badly conditioned walls, and it is therefore not always a safe plan to ascribe the breaking up of the paper to the unadaptability of the wall. The paper hanger may use his paste too thick or too thin; also, he may put on too much or not enough. Or, again, he may fail to brush the paper down firm enough. The paper itself may be at fault. Some papers, by virtue of their brittleness, are more liable to crack than others. A paper which, when wet, will expand the most, is liable to crack, because in drying the shrinkage is often so great as to break the fibers. All such factors deserve study when considering a problem like unto that which our subscriber seeks to be enlightened upon.

SCIENTIFIC PLUMBING.

THE following extract of an excellent address given by Professor J. G. M'Kendrick when opening the exhibition of plumbing work and sanitary appliances, held in connection with the recent Plumbers' Congress at Glasgow, will well repay careful reading.

"Some may ask, why should the public be interested in plumbing more than in the work of the carpenter, or the mason, or the slater, or the plasterer, who also have to do with the construction of our dwellings? No doubt we depend on all the trades, but little consideration shows that, so far as our comfort and health are concerned, the plumber has it in his power to influence us more than any other tradesman. When we consider the plumbing work to be done on the roof, the arrangement for carrying off rain water, the efficient construction of waste and soil pipes, the conveniences of the closet and the bath-room, the distribution throughout the house of gas and water, the system of house drainage, the means of ventilation, we see at once how the plumber more than any other tradesman can make or mar a house. It is, therefore, of great importance that he should be well educated, both in a general way and technically for his special trade, and it is only reasonable that the public should have some guarantee as to his efficiency.

I have no doubt this exhibition must also illustrate some of the advances made in plumbing and sanitary appliances during the last ten or twenty years. For the more ordinary article of every-day use there has been an enormous advance, so that almost everything we now use is better suited for its purpose than its representative of say, twenty years ago. So has it been with the work of the plumber and with sanitary appliances. The use of drawn piping instead of hand-made pipes has made it possible now to have thoroughly tight joints. The modern bath room, in its simplicity and durability, is now almost perfection. All its appliances are handy and fitted for use, and, as a rule, the room is not now a dark place fusted away into an odd corner, but in any well contrived house it is large and airy, well lighted, and in a convenient position. The modern closet, by the substitution of earthenware for metal, by flushing, and by efficient trapping, is a very different thing from what it was twenty years ago, so that in some of its forms it also is almost perfection in the way of being cleanly and of being severely cut off from all source of contamination from the sewer. In the old day pipes, both for gas and for water, were often placed in the most awkward positions, frequently so placed that if anything went wrong it was a serious business to reach them for purposes of repair. Now they are all placed in convenient positions. There is a method for the distribution of gas pipes in every well constructed house, now easily understood, and water pipes are open to inspection, and indeed, are sometimes even ornamented.

Consider also the enormous advance in the method of trapping, by which the risk of communication with the sewer is reduced to a minimum, and the arrangement now carried out for thoroughly ventilating sewers without the danger of contaminating the air of the street or of the house itself. The arrangements also for the storage and distribution of supplies of water to town and village have also greatly improved, so that now, in any well regulated system, it is next to impossible for sewage to enter the current of water.

These, and many other improvements, are visible even to outsiders like myself, and I have no doubt that to the minds of many who listen to me other examples of advancement will occur.

I cannot help noticing that even in humble dwellings sanitary arrangements are now made to an extent not dreamt of twenty years ago. In our great cities, even in the slums, modern conveniences are being introduced into every dwelling; in our country villages, to which the town dweller goes for summer quarters, there to recruit his exhausted energies by rest and recreation and fresh air, every cottage almost has now the appliances of the modern plumber; and the ubiquitous bicycle has improved such things in every little country inn by the wayside.

Now, what is the meaning of all this? Does it not mean that, in common with many other trades, the plumber has become more scientific? Here and there in the craft have arisen men of inventive ability who have recognized the defects of old methods, and who, with scientific instinct, have invented better. There is all the difference in the world between a man who works away, year in and year out, by rule of thumb, and the man who looks at things from a scientific standpoint.

Now, I don't wish you to be frightened by the use of the word scientific. There is really nothing mysterious about what we term science. Many, if not all her problems are mysterious, but science is simply knowledge of external things. Investigate their properties and the laws that regulate them. It has been well called "organized common sense." Science has to find out the laws that govern the outer world, the nature of things, the facts of nature, if you choose so to express the scope of science. The moment a plumber tries to recognise the exact nature of a particular phenomenon with which he is familiar in his trade he becomes scientific. He applies principles to the execution of his work. It is his knowledge of things and of the laws of nature that regulate things by which he is guided.

This exhibition, however, is not intended only to instruct the public, but to stimulate invention among the younger members of the craft of plumbers. Permit me to say a single word to them. In the construction of all kinds of appliances efficiency is usually combined with simplicity. For certain purposes, of course, machinery must be complicated, but as improvements are effected it always tends to become more and more simple. This is consonance with nature. She always brings about important results by simple means. This appears to be especially the case in mechanics, and as all the physical phenomena in the universe are ultimately mechanical the principle holds good throughout. Movements of matter, whether it be of the molecule or the planet, occur with the least possible expenditure of energy in the most direct line, and in the shortest possible time. There is no waste; there is simplicity; there is parsimony. So true is this that if a philosopher gives a very complicated account of a phenomenon, involving intricacies that also baffle comprehension, we may be almost sure his explanation is wrong. Nature probably attains her object in a much simpler way than the philosopher at first thinks, and it is the business of someone to find this out. Therefore the lesson for inventors is to attain their end by simple means.

Before I close I should like to allude to the delight one feels in looking at a well made bit of apparatus, efficient for its purpose. In my laboratory, as a physiologist, I have to use delicate appliances, and, therefore, I can, to some extent at all events, enter into the feeling of the workman who has a pride and pleasure at looking at a bit of good mechanical work. The sight of an engine, a modern turning lathe, with its many exquisite mechanical devices, even of a well made stop-cock, or a good well turned screw; or, to come nearer home, a well-made bend in a pipe, a good solder joint, or a good piece of lead bossing, always gives rise to a certain feeling of satisfaction.

Young workmen, and it is to these I would address my closing words, should aim at efficiency, thoroughness, and, in short, at all the qualities that distinguish a good job from a bad one. A bad piece of workmanship is a moral offence, and it will not be forgotten, although it may be hidden away where no human eye can see it. Bad work by a plumber may bring about dire results to others; at all events, it will inevitably deteriorate the man's own character. Good work well done will, of itself, yield much happiness.

A sandstone slab measuring 7 x 13 feet, 18 inches thick, and weighing 10 tons, has been brought from Nova Scotia to Sherbrooke, and is to be placed above the main entrance door to the new Sun Life building.

Mr. Alexander Bremner, of Montreal, has recently acquired the patent right for Canada of Baker's improved plaster board, and has fitted up a large factory capable of turning out large quantities of this material, the useful qualities of which are testified to by some of the leading architects and builders of Montreal.

The negotiations for the purchase by an English syndicate of the C.P.R. cement works at Vancouver are proceeding satisfactorily, and are expected to be concluded at an early date. It is said to be the intention of the new owners to increase the capacity of the works from 12,000 to 50,000 or 100,000 barrels per year, and ultimately to 1,000,000 barrels per year. There are said to be but few cement works north of San Francisco, and the demand for the material in the territory along the coast is said to reach 600,000 barrels per annum. Most of this demand is at present supplied by England. The syndicate above mentioned will endeavor to obtain control of this trade, and also to supply the Pacific Ocean Islands, Australia, China and Japan, for which their works will be favorably situated, having ready to hand the transportation facilities of the C.P.R.

CHIPS.

Mr. Lacroix, building inspector Montreal, has publicly denied the rumour that the new theatre building on Guy street is insecurely constructed.

Mr. F. J. French, one of the inspectors of paving for Toronto, has recently invented an interlocking paving brick, for which he has applied for a patent.

A handsome new building is in process of construction at New Westminster, B.C., for the Bank of British Columbia, from plans prepared by F. N. Rattenbury and J. G. Tiarks, architects.

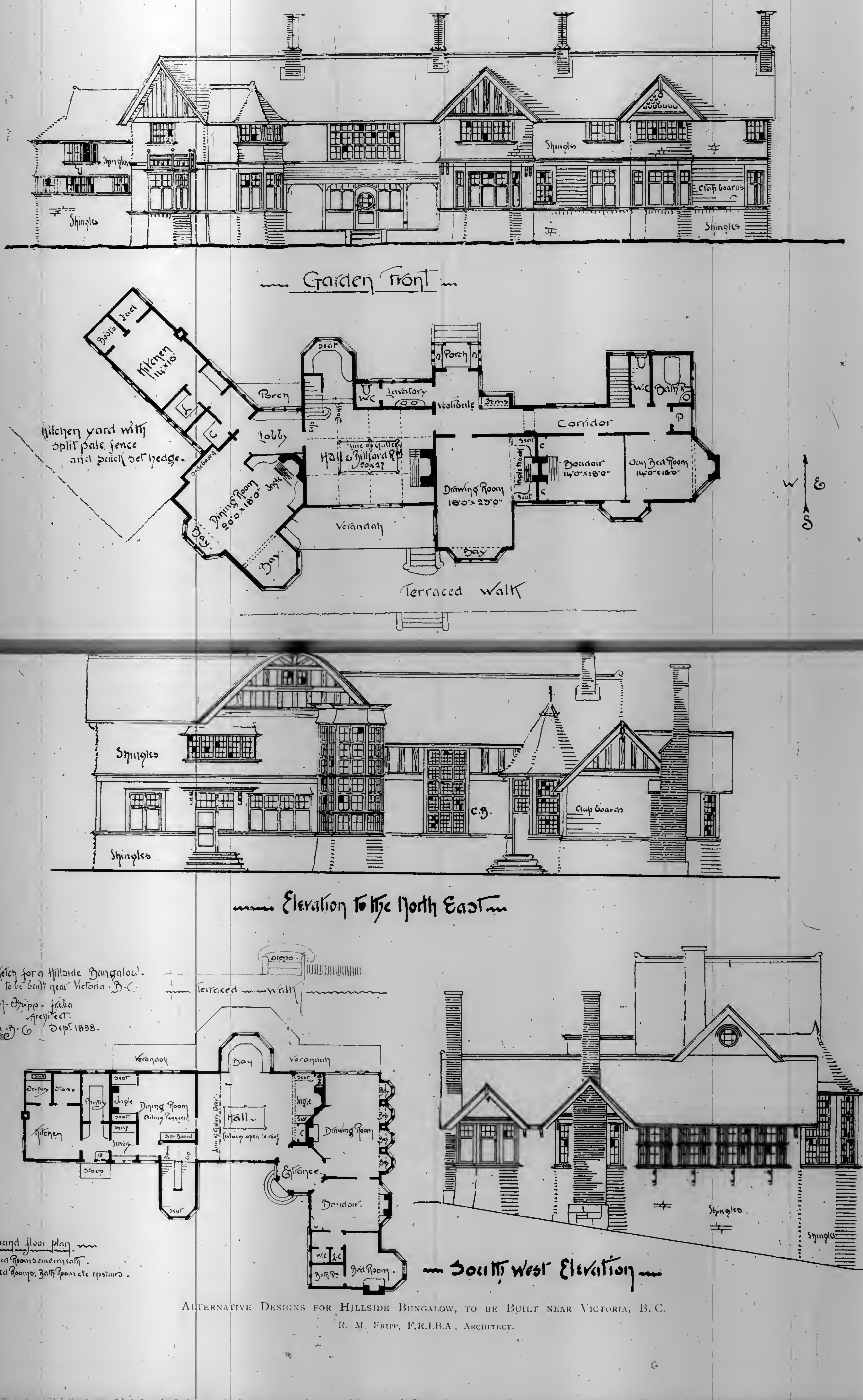
The decoration of the walls and ceilings of the new Bank of Commerce Building at Montreal has been commenced by Mr. W. T. Scott. Numidian marble will form the foundation for these decorations.

Messrs. J. A. Ballantyne and H. Conn, of Ottawa, have recently purchased a site for a brick manufactory at Billings' Bridge. It is their intention to install machinery for the manufacture of all kinds of building brick.

Rev. C. Harper Shortt delivered a lecture on the 4th inst. before the Women's Art Association of Toronto on "King Henry's Gothic." The lecture was designed to awaken a deeper public interestinarchitecture.

The following persons have recently passed the plumbers' examination at Vancouver, B.C.: R. F. Scott, C. Weeks, O. Laursen, W. H. Walpole, B. Weeks, M. H. Thompson, A. Paton, H. McQuarrie, W. H. Braden, W. K. Blackmore, A. Green, A. Shead, S. Mortimer, P. G. Moran, A. J. Morton.

A meeting of the builders connected with the Montreal Chamber of Commerce was held recently to consider the new city charter and municipal by-laws. The meeting decided to recommend that Chapter XII, Art. 1st, of the new charter read as follows; "That the bureau of assessors be composed of eight persons of practical experience in building construction, as follows: One architect, one real estate agent, one civil engineer, and five practical builders." It was also resolved that Sec. 9, Chap. 28, page 115, of the new charter shall read as follows: "That the bureau of arbitration be composed as follows: One city assessor and four commissioners named by the court or a judge in Chambers, of which one is to be a lawyer, one an architect, one a practical builder, and the other a real estate agent. The above commissioners in expropriation to select one of their number to act as president."



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CHAMPLAIN MONUMENT, QUEBEC.

PAUL CHEVRE, SCULPTOR; M CHARDONNELL, ARCHITECT.

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Errata.

IN an editorial paragraph in our last issue, it was inadvertently stated that radiators were selling in the United States as low as 12 cents per "pound." Our readers will kindly substitute the word "foot" for "pound."

Announcement.

THE special number of the CANADIAN ARCHITECT AND BUILDER which for several years past has been published at New Year's, will in future be issued late in March. In view of the fact that building operations in this country are at a stand-still in January and February, it is believed that our annual special number might more fittingly and advantageously be published so as to mark each year the approach to the building season. Preparations are already well under way for the publication in March of our special number for 1899, which it is hoped will fully maintain the standard of former years.

What are "Stock Bricks?"

THE Brighton County Court was recently called upon to determine the legal definition of the phrase "stock bricks," a claim having been preferred by a brickmaker at East Grinstead to recover the price of 16,000 bricks supplied to a firm of builders as "stock bricks," but which were rejected on the ground that owing to their inferior character they were not entitled to be classed as such. The plaintiff's witnesses held that stock bricks should be picked, while, on the other hand, it was contended that stock bricks meant bricks burned in a clamp or stock, and taken without picking. Judge Martineau said that in his opinion stock bricks meant picked bricks, which would be of a higher quality. Judgment was therefore given for the builders, and the counter claim was dismissed. Commenting upon the case, the Builders' Reporter remarks that picking may now be considered a sufficient ground for the promotion of place bricks to stocks. But in the early part of the century the difference between the two sorts was ad-

mitted to arise from the quality of the material, which could not be got over by any picking. Stocks were said to be "made of a good earth well wrought and with little mixture," place bricks being made of "the same earth, or worse, with a mixture of dirt and other coarse materials, and more carelessly put out of hand." It would be satisfactory if the standard were still materials and workmanship as formerly, rather than an indefinite process of picking, which allows of too much latitude.

The New Postage Stamp.

OUR new two-cent stamp is apparently intended to be a smart advertisement of the country. It does not reflect much credit upon us as designers nor as printers. If every country that gets a dab of red in printing this stamp became thereby a member of the British Empire, we should truly justify the vulgar motto at the bottom, "We hold a vaster empire than has been."

Architectural Standards in Ontario and Quebec.

THE Inland Architect is in error in stating that the Architectural Associations of Ontario and Quebec have each in turn secured the passage of an act compelling all practising architects to become members of the provincial association. Unfortunately the members of the profession in Ontario have not yet been given the legal status conferred upon their confreres in Quebec, but are still living in hope that the higher standard of practice instituted in Quebec will at an early day be sanctioned by the Legislature of Ontario.

An Opportunity for Canadian Manufacturers.

MR. H. Manizu, a Japanese architect, is at present in America for the purpose of obtaining information regarding modern materials and appliances, for an important building to be erected by the government of Japan. He invites information, catalogues, etc., from manufacturers of hardware, office furniture, wall and ceiling decorations, lighting, heating and ventilating apparatus, sanitary goods, dynamos, gas and hoisting engines, and modern building appliances of every description. These should be addressed to "Educational Department of Imperial Japanese Government." Canadian manufacturers should not forego this opportunity of bringing their goods to the attention of the government of Japan. Our goods in the above mentioned lines are strictly up-to-date, and are finding considerable sale in other foreign markets. With the advantage of direct shipping facilities, our manufacturers should certainly be able to secure a share of the Japanese trade.

Convention of the O.A.A.

THE annual convention of the Ontario Association of Architects will take place on the 17th and 18th of January. The programme indicates proceedings of the same nature as last year—the first afternoon devoted entirely to business (when it would be well for those to be present who have good advice to offer as to the conduct of the Association); the second day given over to reading of papers and the election of officers. The papers will include two by practical men. Mr. W. J. Hynes will talk about ornamental plastering work and Mr. M. J. Hynes about terra cotta. Mr. W. L. Symons will read a paper on "New Problems in Architecture," and Mr. J. W. Siddall on another architectural subject, not announced at the time of our going to press. The luncheon on the second day was last year more imposing than formerly, and will probably be similar this year, taking the character of a social gathering which formerly was relegated to a dinner in the evening.

A Stimulus to Architecture.

ARCHITECTS and other persons interested in the advancement of true architecture, will greet with satisfaction the recent action of the Municipal Council of Paris in offering prizes to the owners and architects of the most attractive houses erected in the French capital during 1898. It is stated that as a consequence of this action, unusual care has been shown in the design of facades. Particulars of the buildings submitted in competition were required to be placed in the hands of the city authorities between the 1st and 15th of December. The method of deciding the competition has not been learned. Presuming this to be satisfactory, the idea should be a popular one, and greatly assist in improving the architectural appearance of the city. The authorities of our Canadian cities should be urged to follow the commendable example of the Council of Paris. If a number of Canadian cities could be induced to do so, the result would be a friendly rivalry which would awaken a deeper public interest in architecture, and elevate the standard of work throughout the country. The subject is one which might fittingly be considered and dealt with by the architectural Associations of Ontario and Quebec.

Technical Instruction.

PUBLIC attention in Canada is at present directed to the subject of technical education. A public meeting held in Ottawa a few days ago put on record the opinion that a system of technical schools should be established so as to encourage the production of skilled labor, the growth of manufactures and the development of our great natural resources. The Board of Trade of that city has recently appointed a committee on Technical Education, and an effort will be made to have a technical school established at an early date. The Hon. G. W. Ross, Minister of Education for Ontario, in a speech delivered at the annual dinner of undergraduates of the School of Practical Science, referred to the need of a system of technical instruction on a lower plane than that afforded by the scientific schools. His opinion is that in each important city technical schools should be established at the cost of the municipality. Further than this, that the instruction should be adapted to the requirements of the artizan classes in each particular locality. With this view we are not in accord. On the contrary, we believe that the character of the instruction should be such as would be equally valuable to the student wherever his place of residence might be. As regards the manner in which schools of this kind should be established and supported, it would seem but fair that the Federal and Provincial governments as well as the municipalities should contribute, seeing that the country as a whole must benefit from the establishment of a higher standard of education and skill for the artizan classes. The success which is attending the Toronto Technical School and the classes under the direction of the Council of Arts and Manufactures in Quebec, has no doubt been the means of calling public attention to the desirability of extending the movement. It is to be hoped that by whatever means schools of this character are established and maintained, the controlling authorities will see to it that only the most approved systems of instruction and teachers of the highest efficiency shall be employed. If we undertake to provide technical instruction, let it be of the highest grade, so that our artizans may be the equals of the best in the world.

EVERY MAN HIS OWN BARBARIAN.

IT has been said that the further advancement of architecture must wait for another irruption of barbarians to show us the way. This proposition has the evidence of history on its side; but, inasmuch as the order of the world's movements has changed, and irruptions are now made not by the barbarians but upon them, it seems as if we may wait long and in vain for any chance of improvement to architecture in this way. What then must we do? Architecture must go forward or it will cease to live. It is clear then that the problem is to find the barbarians.

If we examine what the force was which the barbarians brought to bear upon building so as to cause it to assume new forms, we find it to be nothing but that practical logic which in matters not artistic has always appeared to be a characteristic of the English. Before art that nation of shopkeepers for a long time bowed with reverence as to something beyond the comprehension of ordinary men, and followed submissively any lead, until at last it became ridiculous even to itself, and out of its abjection is arising a horde of young men who have discovered that the common sense which the English have applied to other walks of life is applicable to art also. These are the barbarians who promise to make the English a regenerating force in architecture.

Let us not, however, wait for their developments. It was not the spread of the Goths' and Lombards' method of work that produced Gothic architecture, but of their method of thought.

What was there in their method of thought that made architecture revive in their hands? Primarily, we may say that it was ignorance of the Greeks. The conquering Roman was, in matters of art, subdued by the Greek he had conquered. He perceived the beauty of Greek work, and put himself in Greek hands to have his own building made beautiful. These German invaders knew nothing about the Greeks. They only knew what they wanted and found in the Roman buildings material ready to their hand for what they wanted to do. When it suited them they took details bodily; when they wanted something different in form they regarded the Roman buildings simply as quarries of material and hewed what they wanted out of the choicest stones. There was no reverence for antiquity for its own sake; these ancient moderns had not arrived at that development of modernism. Nor was there any religious feeling for the relics of an ancient worship; though barbarians the Lombards were good Catholics, and they made rubble walls with the statues of the Roman gods. What their work was like there are some examples to show—barbarous enough in its ill-fitting detail those who have seen it say, but it has the starting of the character which was afterwards developed into what we call Lombard architecture, from which sprang the architecture of the middle ages. The Romans were in the line of progress to this result but missed it. We can see now how the developments of Gothic architecture proceeded from a basis of the constructive attainments of the Romans. What is before ourselves we cannot see and may perhaps never see (though movement is rapid in these days); but though we may see no result, at any rate no far result, the game is worth playing for its own sake. The barbarian's work was a man's work; that of the Greeks who festooned the Roman buildings with architecture was not. The barbarians' method has always resulted in improvement, and in rapid improvement; the method of the Romanized Greeks has always led to degeneration.

There is no talk of degeneration in Canada just yet, and fortunately the period of substantial buildings in this country is coming on at the same time as the forward movement in architecture. It is a time not only of a better understanding of the principles which underly good architecture but of such changes in the materials of construction that old models must fail as models and can supply only principles. There is no use in sneering at principles. To make light of the necessity for principle in design is only another form of the prejudice in favor of a "practical man" as opposed to a scientific architect. The practical man idea is now exploded. It is quite clear that architecture has got beyond him. It is not so generally recognized, but there can be little doubt that it soon will be recognized, that architecture is getting beyond the reach of imitative design. Indeed, there is much imitative design that we might already have dispensed with, and to begin now to do so would be the surest way to acquire that simple directness which is the mark alike of the barbarian and of the highest culture, and which is the only hope of any solution of our own great problem how to make architecture of the birdcage building.

The time honoured shams which form so great a portion of our stock in trade are of this nature. Let us see from a couple of examples if they are really necessary to us. The tin cornice is a great unifier to a restless building, but there are more ways of making a cornice tell than by making it project. As a matter of fact, projections are awkward things to handle in a street front, and the tin cornice is often in difficulties which would be avoided if, instead of imitating the stone we cannot afford, we used stone in a way in which we can afford it, and were thus forced into the discovery that we may diminish the projection of a cornice if we increase its height. The barbarians were fond of an arcade to crown their buildings. It gave emphasis without much projection, of which latter they were perhaps afraid. Most business fronts have a flat roof sloping a long way back and requiring therefore a good deal of height in front above the ceiling. All conditions are therefore favorable for development here, and we venture to think that the adornment of this space is susceptible of as much beauty as and more variety than the tin cornice.

Another piece of imitative work which has the respectable countenance of the Colonial designers is the glued up wooden column designed in stone form. As a hindrance to thought this piece of imposture is entitled to a place in the very front rank. How many a building depends entirely for its effect upon its portico! No further effort is necessary. Without this effective but deceptive and in the long run debasing expedient there would have been more thought, less bastard grandeur, and more characteristic treatment of the simpler class of buildings. For buildings in which there is room for a fair amount of expenditure there is nothing prohibitive about the cost of sufficient stone columns. An upper structure of moulded stone would make a heavy bill, but there is no occasion for this. There are constant examples in Italy of beams and rafters laid on marble columns. The little cloister of San Gregorio in Venice, which appears in Mrs. Oliphant's "Makers of Venice" and other illustrated books about Venice, has its open corridor constructed in this way. It is, in fact, nothing but a verandah surrounding an interior court. It is not even necessary to have stone columns in order to produce an effect that satisfies both the eye and the mind. There are examples in our own work constructed with good square wooden posts and beams. Turning has been often abused, but it need not be so. The fatal modern defect of making everything like something else has given to turned wooden constructive posts the appearance of gigantic balusters, but this need not be so. A barbarian's "sure intent" would not fail to bring out the true feeling of a wooden post. To him and to all who follow in his footsteps each constructive feature has an expression inseparable from its use; columns, arches, beams, cornices, labels, walls themselves, have logic and language. To study them, enjoy them for their own sake and work them out in design is good manly work, and in it is the only hope of architecture.

CANADIAN CITY ENGINEERS.

VIII.

MR. John Galt, C.E. & M.E., the subject of our sketch, who has lately succeeded to the position of city engineer of Ottawa, the capital city of the Dominion, although well known in Toronto and Western Canada, is a native of Scotland, where he obtained all his early engineering training and experience.

His practical workshop and drawing office experience was first obtained at Kilmarnock, Scotland, and his scientific education at London and Glasgow, after which he was with large firms of consulting engineers and contractors as assistant engineer in many improvement works in the city of Glasgow and throughout Scotland.

His practical and scientific engineering attainments were considered of a high order, and crossing the Atlantic fully 20 years ago, he acted as engineer and draughtsman with the Baltimore Bridge Co., of the United States, and afterwards on railway construction.

Mr. Galt came to Canada about 16 years ago to take

MR. JOHN GALT.

the position of general manager of the Boiler Inspection and Insurance Co. of Canada, but after four years' time began his active private practice as consulting engineer and expert. Of late years his practice was confined chiefly to general municipal engineering work, covering mostly the design and construction of waterworks and sewerage systems.

In addition to being a civil, hydraulic and sanitary engineer, Mr. Galt is well known as a mechanical engineer, and at the time of his appointment had several large works on hand, aggregating about $1,000,000.

Mr. Galt is in the prime of life, being 40 years of age. He has a pleasing, genial disposition, with characteristic quiet firmness, exercising genuine good sound judgment and tact.

Backs of panelling, or any woodwork which has to be fixed against a wall, should have a thick coat of oil color before fixing. Before the next coat is applied the surface should be lightly rubbed down with glass paper, and the brad holes, open joints or cracks filled with hard stopping, and the dust removed.

STUDENTS' DEPARTMENT.

C. A. & B. STUDENTS' COMPETITION.

WE had expected to be able to announce in this number the result of the Students' Competition for chimney designs. At the time of going to press, however, the report of the Committee of the Province of Quebec Association of Architects had not come to hand. We are therefore compelled to defer until our January issue publication of the decision of the joint committee, to whom were submitted the drawings in this competition.

DRAWING WITH LEAD PENCIL.

LEAD pencil has the advantage over most black and white mediums in that it gives us a delicate grey and a rich black, a clear-cut outline and broad masses of dark; it is clean and convenient, writes Ernest Knaufft in the Art Amateur. Pencil may be used upon any kind of paper, but rough paper is most commonly used. A hard or soft pencil may be employed throughout, or both hard and soft pencils may be used. As a general rule a soft pencil (say an F or a B), if allowed to touch the paper but lightly, gives the prettiest results. All artists object to work where the pressure of a hard pencil makes an indentation. It takes a little practice to use a soft pencil satisfactorily at first, for it invariably makes a darker tone than was intended. The pencil may be kept sharp by rubbing it upon a piece of sand-paper. A sharp point allows one to obtain a clear outline, which is one of the most desirable things for a beginner, for though he may not use it in his final effect -- that is to say, may not intend his drawing for an outline drawing—yet it permits him to separate one object from another in the beginning, which prevents slovenly drawing in the end. Let me explain: A shrub or a tree should be drawn in its entirety, and any drawing in which the final effect separates the branches to too great an extent, so that we cannot tell whether we are looking at one shrub or several shrubs, one tree or several trees, is, of course, a bad drawing; on the other hand, too, the drawing of a near-by tree which is so slovenly and indefinite that we cannot know whether it is meant for an elm or an apple, a peach or a chestnut-tree, is also bad drawing; and such indiscretion comes almost entirely from the student's failing to give a true delineation of the shadows among the branches and of the shape of the margin of the branches against the background. Now, to avoid this indefiniteness in your finished drawing, you should be most particular in your first sketch in mapping out the contour of shadows and margins in your preliminary sketch with a clear outline, no matter how much afterwards you may blur the shadows and margins in order to mass your foliage, that it may melt into the background. Then, wherever a shadow or contour should be brought out, you will be able to bring it out with exactitude if your preliminary outline is carefully done. There is here a mental attitude to be taken into consideration;—the final effect of a shaded pencil drawing, if it be correct in values, depends upon the pressure of the pencil (if one pencil is used by which different degrees of dark are got). Now, it is no easy task, even after all your outlines are finished, to put in your shadows with a proper intensity. You have to be alert at every stroke of the pencil. If you do not press enough on the pencil your tone is too gray, if you press too much you have a worse result. If the tone is too dark and your rubber must be used you may smear the paper (though an expert with a rubber avoids smearing, for he cleans his rubber on the margin of the paper before using it).

Now, if the student, in finishing his drawing, has not only to worry about the intensity of his shading, but has also to worry about the shape of the shadow, why, his labor is increased twofold. Therefore, for this reason, endeavor, in your preliminary sketch to place all your principal shadows so that when you are making your final drawing your mind is occupied solely with the intensity of the tones.

From January 1, 1899, says a daily paper, the Vatican will be lighted throughout by electricity. Preparations for the installation have already been commenced. The motive power will be supplied by water flowing at a quick rate of speed from Lake Bracciano, which lies high up in the mountains twenty miles north of Rome. The Pope is declared to be taking great interest in the work.

HAMILTON

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PERHAPS the most interesting piece of news from this city for this month is the formation of a Builders' Exchange, the possibility of which was alluded to in my last letter. Two meetings were held, at the first of which the advisability of such an organization was fully discussed, and it was resolved that those present should form themselves into an association. Provisional committees were struck to draft by-laws, and look about for suitable rooms at which meetings could be held, and the meeting adjourned till Tuesday, 29th Nov. In the interval all who were not present were to be looked up and invited to attend the adjourned meeting that every trade might be fully represented.

On the evening of the adjourned meeting a large number of builders and contractors in all trades, with a sprinkling of material supply men and half a dozen architects, put in an appearance. Mr. John T. Irwin was asked to preside, and the provisional secretary, Mr. J. H. Smith, to act as secretary. A set of provisional by-laws was then read and agreed to so far as they went, and officers were elected as follows:

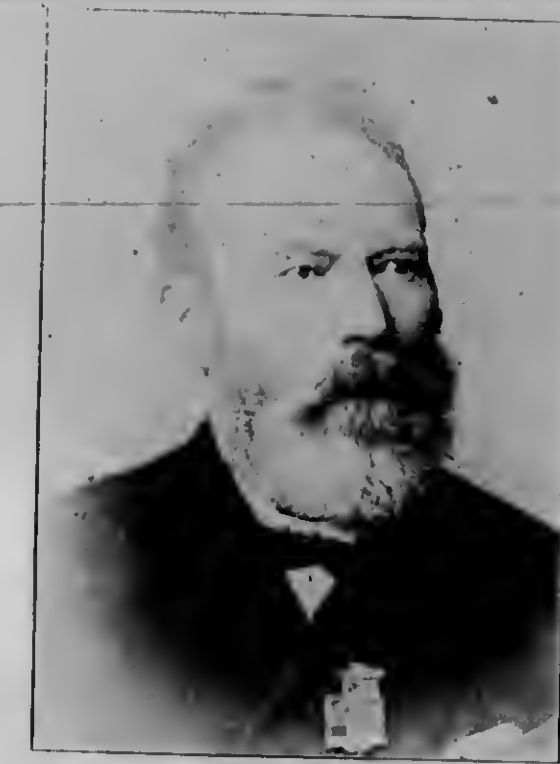
President, Mr. John T. Irwin.
Vice-President, Mr. William Hancock.
Secretary, Mr. J. H. Smith.
Treasurer, Mr. W. J. Reid.
Directors—Messrs. J. Ross, J. D. Pocock, F. A. Carpenter, A. Clark, G. Clapham.

The intention is to rent rooms at once suitable for the purposes of the Exchange, and get into working shape as soon as possible.

MR. JOHN T. IRWIN,
President Hamilton Builders' Exchange.

A meeting is to be called in a few days to consider the provisional by-laws, and get them amended and confirmed.

The Hamilton Builders' Exchange begins its existence on a broad basis that should ensure its success, not only as an association of contractors meeting together for their own good, but as a means of bringing together all men connected with building. It is to include in its membership all material supply men, manufacturers of builders' supplies and so on, and certain architects will be elected as honorary members. The president is a member of the firm of T. Irwin & Sons, slaters and roofers, and the secretary, Mr. J. H. Smith, of the J. H. Smith Iron Manufacturing Company. In the choice of the remaining members of the board of directors, representation has been given to as many trades as possible. Some thirty men signed the roll for membership, which will in a short time receive a large number of additional signatures. Of course, the CANADIAN ARCHITECT AND BUILDER will be the official



MR. WM. HANCOCK,
Vice-President Hamilton Builders' Exchange.

paper of the Exchange. Mention was made of the paper at the meeting, and it was admitted that it would be a first rate means of communication between the Builders' Exchanges of the various cities.

R. W. GAMBIER-BOUSFIELD.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

THE ONTARIO ASSOCIATION OF ARCHITECTS.

HAMILTON, December, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER:

DEAR SIR,—I am hesitating a good deal about writing you another letter for publication in this month's issue of the CANADIAN ARCHITECT AND BUILDER, but there is a matter that, in the advanced state of the season, will not admit of being held over another month. This matter is the Ontario Association of Architects. I have not kept up my membership for the past few years, but I have always taken a great interest in the Association, and have deeply regretted that it is apparently receding rather than advancing, and that very many members have lost heart at the repeated failures to obtain legislation. I wish very much that some of the old vigor and goodfellowship which characterized the inception of the Association were more in evidence to-day. It is time to ask what is to be the future of the O.A.A. I venture to offer a little criticism and to make a suggestion or two. Very great praise is due to the vigorous members of the Council for the zeal they have displayed in the attempt to secure legislation, in establishing examinations and placing the Association in the position of prosperity it once occupied. But, as I often stated, the policy of our Councils was wrong. Two matters of the utmost importance were neglected. The first was the failure to make the Association a real value to its members, and the second that it always kept itself in the background and aroused no interest in the public. From one convention to another its name was hardly ever to be seen in the daily press. Surely the first essential to the success of any association is that it shall make itself of value to its members. Legislation being the ultimate object of the O.A.A., it was right to keep that in view, but it was a mistake to make that the one and only object. Legislation being the object, the O.A.A. should have been kept prominently before the public, and such action taken by the Council as would have made the public recognize its value as an advisory board. I know that attempts were made to move in public matters, such as in forming building by-laws and so on, but it was done in a wrong spirit; the Council was too dogmatic. Public lectures, a very few of which were

given, were poorly attended, because the public did not know what the O.A.A. was. The subjects were not such as would interest the public, and they were not held down-town. The lecturers were unaccustomed to lecturing. All such efforts were far too spasmodic.

If the Association is to be of any use, if it is to live, a radical change must be made. The O.A.A. has a charter and it must not be allowed to get mouldy. The next annual convention is drawing near, therefore now is the time for action, which must be immediate and decisive. Architects outside Toronto see no advantage in remaining members. Let the Council think out a plan by which the O.A.A. can be made attractive to them; something else than paying a subscription to help students. Put the idea of obtaining legislation into the background for a few years. Have no more "figure-head" presidents. Let us have new blood in the Council—active men who are not worn out with the failure of their efforts in the past. Let the programme of the conventions be really interesting—worth going to Toronto for. If there are lectures, don't let the lecturers say they have not had time to prepare, and don't give us extracts from text books by way of lectures. Suppose the Council set to work, issue an earnest appeal to all the architects of the province to come to the convention, whether they are members of the O.A.A. in good standing or not, for the purpose of discussing its future, and let them have a scheme to submit. When all the architects have learned that the O.A.A. is a necessity, and when the public have learned it is a good thing, then legislation may be asked for and will be easily obtained. A good many besides myself would be glad to rejoin the O.A.A. if the Council can give us good reason for doing so.

Yours truly,

R. W. GAMBIER-BOUSFIELD.

TORONTO, December 16th, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—I am obliged to you for sending me a proof of Mr. Bousfield's letter. I have no remarks to make upon it except that, if Mr. Bousfield can propose any definite plan for making the Association of more value to the profession, the Council will be very glad to hear from him. Indeed, I am instructed to ask him to read a paper upon the subject at the next convention.

Yours truly,

W. A. LANGTON, Registrar.

THE LYCH-GATE.

HAMILTON, Nov. 18, 1898.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—In defending some one whom we now know to be Mr. Gibson, for making use of a lych-gate, as it was supposed to be by the writer of your leader in October, it seems I have struck a snag. The lych-gate has developed a serious and alarming argument as to, in what the skill of an architect lies, while it remains itself in the field as a subject for discusssion as to the propriety of its use in these days. I feel inclined to get rid of the lych-gate first, as being the lesser subject, that I may have more room to deal with the other and larger question, so here goes. First, as to whether the lych-gate "has any real use." I would like to ask the writer of the leader if he has ever witnessed an old country scene, which, though I have nothing of the novelist about me, I will try shortly to describe. There has been a death in the village and there is to be a funeral in consequence. All the village takes a great interest in such an event, and crowds of rustics, male and female, old and young, collect not at the house or cottage, for that would not be village etiquette, but respectfully at the church yard gate. As the time for the arrival of the funeral procession draws near, a lane is formed by the crowd along which the coffin bearers, on foot, followed by the mourners, may pass to the gate. The bearers reach the gate; here there is a delay, they must await the arrival of the clergyman, who will come to the gate to meet the procession; perhaps, too, it may be necessary to wait the arrival of other mourners from the country side. The bearers are not sorry to have the opportunity of taking a rest before proceeding with the coffin to the side of the grave. The gate is a lych-gate and forms a convenient place under which to rest the coffin, sheltered from sun or rain, and obviously it is more fitting to let down the coffin here than out in the open road. Here then is the use of the lych-gate. (Lych or corpse gate—from "lich," Anglo-Saxon for corpse). The lych-gate is an exceedingly picturesque feature and an adaptation of it for the purpose of an entrance to a garden park or anything else, I maintain is perfectly legitimate, and that the scathing criticism against such a procedure is absolutely uncalled for.

Now for the "skill of an architect" and in what it consists. I do not want to be too severe as the author of the leader which has given rise to these letters is to me an "unknown quantity," but I feel like handling him without gloves. What does he mean by the sentence "On the whole there are few 'features' characteristic of former generations that remain in use in the present time, and can be imported bodily into modern work."' He places the word features between commas, and perhaps he attaches a different meaning to it than that which is usually understood by the word. By the word features we understand windows, doorways, spires, towers, columns and a hundred other portions that go to make up a whole design, even including lych-gates, all of which remain in use at the present time, and I say that an architect shows his skill by adapting these features to present day requirements. But the leader writer, according to his argument, would consider that an architect who made use of the lancet form of window and adapted it for, say, a staircase hall, was glaringly ignorant of the first principles of his profession. Then let one ask him how did "Mediæval designers" "make features." If my clerk, with six months reading of elementary treatises on architecture made use of such an expression, and told me that Mediæval architects "made features" I should tell him he had better start and read his book again for that he had missed the whole principle of the development of the art. Did the "Mediæval designer" MAKE features out of the requirements of his time or out of anything else?

Our unknown quantity says that architecture is "a process" and he is right, and therefore he ought to know well enough that the "Mediæval designer" simply assisted in the process of development, he did not make features, he could not do it any more than we can now-a-days; he adapted—he made use of the work of centuries, the study of generations of his predecessors, and he adapted their work, and produced a further step in the gradual process of development. "Adapt" does not mean "slavishly copy," but rather to cut and shape, turn and twist, if need be, to make a general outline and even detail and make it suit a present day requirement. All architecture since the fifteenth century is classed as "imitative," and if the word "imitative" is a correct description of the work of the last three centuries, certainly the word "adapt" is appropriate. Our work therefore being "imitative," or "adapted," it is not produced by the same process by which "good architecture" was produced in olden times. The development of architecture was due entirely to structural necessities—a well known fact—to be observed in the work of all past ages. These structural necessities naturally differed in every climate, and were dependent upon the materials at hand. Nothing is more interesting than to trace the various steps of development from the earliest and rudest structures, first to the application of the arch, and then the various consecutive stages in the history of the arch, until the climax was attained in the pointed arch, which was, we may truly say, forced upon the "mediaeval designers" by the necessities of construction for a particular purpose.

But I am not now lecturing to a class of students; when next I do so I shall be glad to give your leader-writer a ticket of admission, as further remarks on the history of architecture would be more appropriate there than in your correspondence columns. I am sorry to have to inflict so long a letter upon you, but your leader is responsible for it.

Yours truly,

R. W. GAMBIER-BOUSFIELD.

[Mr. Bousfield's graphic description of the use to which the lych-gate still continues to be put in England accounts clearly for its invention as an adjunct to an English churchyard, but not for its application as the entrance gate of a gentleman's house, which was the point in question. As to the larger questions—what is a feature; did mediaeval designers make them; and why should we not adapt them to other purposes? We can only reply that we should call the lych-gate a feature; that the mediaeval designers certainly made it to meet requirements such as Mr. Bousfield describes; and we think its adaptation as a gateway to a gentleman's house is questionable, because it is formed to meet requirements which do not exist in a gentleman's house. That they do still exist in a cemetery is a reason not for but against its ornamental application elsewhere.—EDITOR C. A. & B.]

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MONTREAL'S NEEDS.

THE Insurance and Finance Chronicle of this city, which, by the way, is the property of ex-Mayor Wilson Smith, calls attention to the fact that Montreal requires a few important public buildings to place her in rank with other cities of like importance. The list of requirements includes a new city hall, a public library, a national museum, a public assembly hall, an art gallery, a custom house and post office and gaol. Regarding the first of these, it is recognized that the present city hall is too good to be sacrificed at present, but the gaol is declared to be "a disgrace to any government." It is urged that the cost of these improvements should be defrayed by private munificence and from the Federal and Provincial treasuries. Architects and builders would like to cherish the hope that some of these improvements will shortly be undertaken, but I must confess that the signs of the times do not appear to point in that direction.

INDUSTRIAL CLASSES.

The total attendance of pupils at the classes of the Council of Arts and Manufactures throughout the province is 1100. The number attending the classes in this city is 375. It is said to be the intention of the Council to open new classes next year. They have also announced their purpose to make awards in the form of medals and useful articles to the most deserving pupils.

UNIFORM HEIGHT OF BUILDINGS.

The Montreal Real Estate Owners' Association at a recent meeting resolved to petition the City Council to pass a by-law compelling the uniform height of buildings to be erected on new streets. The object is to prevent depreciation in the value of buildings of moderate height by reason of the placing of tall buildings alongside them. The suggestion is one that should receive the careful consideration of the Council. For many years in Paris regulations governing the height and character of buildings fronting on the public thoroughfares have been enforced. Within the last two or three years, since the injurious effects of the sky-scraper style of building have become manifest, regulations have been adopted in Boston and Chicago restricting the height to which buildings may be reared in the future. The Real Estate Owners' Association would appear therefore to be in line with the most advanced legislation on this subject.

A CRITICISM.

A correspondent of the Gazette, writing under the nom de plume of "Civis," criticizes the constructional methods employed in this city in terms following: "In fireproof buildings, girders sustaining concentrated loads or bays of I beams and masonry, arching should span, as well as be supported on steel stanchions fire protected. Also stone moulded window sills, cut in three pieces, while the stone ashlar appears but veneering with bed and butt joints conspicuously yawning, and misplaced. Such parsimony in stone may be observable in jerry structures, but absolutely insults the status of representative institutions."

WIND PRESSURES.

Mr. Chas. Baillarge, City Engineer of Quebec and ex-President of the Province of Quebec Association of Architects, writing to the Engineering Record on the subject of "Wind Pressures on Surfaces of Different Areas," says: "These differences may be accounted for on the assumption that a gale of wind presents areas of maximum pressure far in excess of the average pressure. For example, in a gale at Quebec the galvanized iron roof sheeting of four of the octagonal kiosks on Dufferin Terrace remained untorn, while a fifth kiosk, in the midst of the other four, had its sheeting bent, twisted and torn off, while the entire roof framing of cast and wrought iron, well bolted together, was wrenched from its eight supporting columns. The whole roof, weighing 2½ tons, was raised to a height of some 40 feet, and carried a distance of about 300 feet, where it was dropped in a broken condition on the glacis in the rear of the terrace. It is evident that in this case there was within the general stream of wind blowing up the St. Lawrence against the terrace an intensified current which struck the demoralized structure. I reduced the subject to figures at the time, some ten years ago, and found that while the anemometer indicated only 59 pounds' pressure, the stress on the roof of the kiosk which tore away and hurled it such a distance must have amounted to least 100 to 120 pounds to the square foot."

NOTES.

Mr. Archibald Spence, inventor of the "Daisy" hot water boiler, died in this city recently, after an illness of eleven years.

As a result of government inspection recently, the city hospital has been declared to be no longer habitable, so that its early replacement may be looked for.

The news comes from Paris of the death, at the early age of 29, of the famous sculptor, M. Lecardonnel, who in conjunction with Cherest designed the Champlain Monument at Quebec.

The President of the Royal Canadian Academy, Mr. Robt. Harris, recently resumed work in his studio, Phillips Square, after having spent seven months in visiting the art galleries of Europe.

Messrs. D. Norman MacVicar and J. C. A. Heriot have withdrawn from the firm of Brown, MacVicar and Heriot, architects, and have formed a partnership under the name of McVicar and Heriot, with offices in the Canada Life Building.

At the ball lately given by Mrs. Meighen, 140 Drummond street (formerly the residence of Lord Mount-Stephen), an unique effect of lighting the main staircase and hall was produced with reflectors placed outside of the stained glass windows and ornamental skylight. As the art glass was exceedingly handsome, and the lights not spared, the effect was excellent. The job appears to be in for all time, as the rubber lead encased wire is laid firmly outside the house on the limestone, and does not make an unsightly piece of work either, as the lead makes a fairly good match as regards color to the stone.

The Builders' Reporter and Engineering Times, of England, recently contained the following: The Canadians are showing loyalty by seeking professors of architecture and engineering in this country. The latest appointment is that of Mr. E. G. Coker as assistant professor of civil engineering in McGill University, Montreal. Mr. Coker is not only a graduate in engineering of Edinburgh University, but he has had an unusually extensive training in experimental engineering in the laboratories of the Universities of Cambridge and Edinburgh; Owens College, Manchester; University College, London; King's College, London; Finsbury Technical College, and the Heriot Watt College, Edinburgh. In 1896 he was offered the senior professorship of mechanical engineering in the Worcester Polytechnic Institute, but declined the appointment in order to pursue further studies at Cambridge. In Montreal Mr. Coker has plenty of scope to exercise his abilities.

SIR CHRISTOPHER WREN.

THIS renowned architect was born at East Knoyle, in Wiltshire, on October 28, 1632. His father, Dr. C. Wren, was Dean of Windsor, and young Wren was educated at Westminster School under the celebrated Dr. Busby, being afterwards entered, while yet only in his fourteenth year, as a gentleman-commoner of Wadham College, Oxford, where he distinguished himself in mathematics. In 1650 he took his degree of B. A. and in 1653 that of M.A. Evelyn spoke of him about this period as "that rare and early prodigy of universal science." In 1657 Wren left Oxford for London, where he became Gresham Professor of Astronomy, but four years afterwards he returned to Oxford as Savilian Professor of Astronomy. Before leaving London, he had, however, assisted in laying the foundation of the future Royal Society.

ILLUSTRATIONS.

A HOUSE IN ROSEDALE, TORONTO.—R. J. EDWARDS, ARCHITECT.

HOSPITAL, CHARLOTTETOWN, P.E.I.—C. B. CHAPPELL, ARCHITECT.

ALMSHOUSES, CHISLEHURST, ENG.—A. T. TAYLOR, F.R.I.B.A., ARCHITECT.

PUTTING THE FINISHING TOUCHES TO THE TOWER OF THE NEW MUNICIPAL BUILDINGS, TORONTO.

The accompanying illustration shows the roofers engaged in putting the finishing touches to the new municipal buildings, Toronto. The platform shown at the apex of the tower was erected for the purpose of putting in position a terra cotta finial 12 feet in height. When it is mentioned that this finial stands 300 feet above the ground level, it will be admitted that the job which is engaging the attention of the workmen is one requiring no small amount of skill and nerve. Messrs. Duthie & Sons, of Toronto, are the contractors for this work.

The total weight of this tower is upwards of 11,000 tons. It rests upon a foundation 72 feet in diameter. The tower itself is 32 feet square. The clock tower is 56 feet below the summit. The opening designed to show the clock dial is 20 feet in diameter, and from this point a magnificent view of the city is obtainable.

TORONTO CHAPTER OF ARCHITECTS.

THE Toronto Chapter of the Ontario Association of Architects held a very successful meeting in the School of Practical Science on Monday evening, Nov. 14th. There was an attendance of about sixty, which augurs well for the success of these meetings during the winter. The Chapter meets on the evening of the second Monday in each month, and all members of the profession, students and all persons interested in architecture are welcomed.

The lecturer at this meeting was the Rev. C. H. Shortt, M.A., his subject being "English Ecclesiastical Architecture in the Time of King Henry." Mr. Shortt prefaced his lecture by a few remarks upon the great desirability of bringing home to the public the pleasure and benefit which they would derive from a study of the history of architecture, and showed clearly how the development of culture and good taste in the art depended not only upon the knowledge and experience of the architect, but also upon a knowledge by the public of the difference between good and bad work. He urged the members of the association to become leaders in an organized crusade having that object in view. In his address on Perpendicular Gothic he dwelt upon the criticisms of the work of that period by Ruskin and others, suggesting that it was more severe than the faults of the work warranted, and making a strong plea for the right of recognition of many beautiful features of the architecture of the period. He conducted his audience through the transition from the early Norman work to the choir of Gloucester Cathedral and the veneering of the nave of Winchester, and showed how free from plagiarism was the work of that time, and how nowhere out of England could work of this character be seen. That was a period of monarchs whose orders were simply that a grand building should be erected, regardless of cost and conditions such as surround the architect of to-day. It was a period of wealth and prosperity in England. The lecturer referred to the introduction of colored glass in churches, and showed how it became a cause for the enormous windows of the period, divided into numerous panels by beautifully moulded mullions running to the top of the shield of the arch, and the probability that this led to the panelling of stone walls and the filling of the panels with paintings. After a brief discussion and a vote of thanks to Mr. Shortt, the meeting adjourned.

At the regular monthly meeting held in the School of Practical Science on Monday evening, December 12th, the chair was occupied by Mr. Helliwell. Mr. A. F. Wickson and Mr. W. A. Langton were unanimously re-elected to represent the Chapter on the Technical School Board. Mr. F. S. Baker read a paper giving an Englishman's impression of "Domestic Architecture in the Eastern States," which was discussed at length by the members present. The next meeting will be held on Monday evening, January 9th, when a paper will be read by Mr. J. Wilson Gray.

S. P. S. DINNER.

THE tenth annual dinner of the undergraduates of the School of Practical Science, Toronto, held on the 9th inst., was as usual a well attended and successful function. The chair was occupied by Mr. W. E. H. Carter. Among the invited guests, in addition to members of the Faculty, were the Minister of Education; Mr. S. H. Townsend, President of the Ontario Association of Architects; Prof. Mavor, Toronto University; Mr. A. W. Campbell, Provincial Road Instructor, and Mr. Archibald Blue, of the the Ontario Mining Bureau. The Minister of Education, referring to the development of the School of Science, stated that in 1883 there were only 11 students, as compared with 160 this year. He likewise made the gratifying statement that so far as he was concerned the school should want for nothing in the way of equipment necessary to its highest efficiency.

The credit for the success of the dinner is largely due to the efforts of the following gentlemen comprising the committee: Messrs. W. E. H. Carter, Chairman; T. Shanks, Vice-Chairman; Alex. H. Smith, Secretary; W. F. Thorold, Treasurer; W. H. Boyd, W. W. VanEvery, F. F. Clark, C. H. Boehmer, W. F. Grady, L. Yeates, J. B. Roaf, J. F. Wilkin. The menu was printed on white tracing paper, enclosed in a cover of white drawing paper, having as a frontspiece an artistic pen and ink sketch, the work of Mr. W. H. Boyd.

PERSONAL.

Mr. John H. Tilden, of the Gurney-Tilden Company, has decided to be a candidate for the mayorality of Hamilton.

The announcement is made in the public print of the intended marriage at Flushing, Long Island, N. Y., on the 29th inst., of Mr. Vaux Chadwick, architect, of Toronto, to Miss Bessie Murray

BY THE WAY.

THE report comes from England that a woman is to be admitted for the first time as an associate to the Royal Institute of British Architects. She is said to have passed with honors the entrance examination. We are not given the name of this clever pioneer in the ranks of the feminine architects.

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A NEW method of preserving an old brick building which showed signs of early collapse was recently adopted by the authorities of the South Dakota State Asylum. The structure was encased with a heavy coating of cement, which has rendered it impervious to the weather. An antique Tyrolese finish has been given to the cement coating, which is described as very pleasing. What the effects of frost and unequal expansion and contraction between the two materials will be remains to be told.

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A WELL known tea company have inquired of the Mayor of Toronto if they might rent for advertising purposes the clock tower of the new Municipal Buildings, pending the arrival of the clock. They offer to pay a reasonable sum for the privilege. Doubtless the citizens would like to hit on a plan to make a revenue out of these buildings, in which a couple of millions of their hard cash have been invested, but it is just possible that they would consider the above-mentioned method as being rather infra dig.

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THE Philadelphia Record purports to describe the origin of the elevator, which is to-day so necessary an adjunct of all important buildings. The earliest mention of the elevator, which is said to have been invented in Central Europe, is declared to have been made in a letter of Napoleon I., addressed to his wife, the Archduchess Maria Louise. He writes to her that, when in Schoenbrunn, then the summer residence of the Austrian Emperor, near Vienna, he used the "chaise volante" (flying chair) in the castle, which had been constructed for Empress Maria Theresa to save her the annoyance of climbing up the long flight of stairs. It consisted of a small square room, sumptuously furnished with hangings of red silk, and suspended by strong ropes, with counterweights, so that it could be pulled up or let down with great ease in a shaft built for the purpose about 1760. The great Corsican mentions that when he first entered the "flying chair" he was asked for his weight and that of his two companions, probably in order to employ the proper counterweights, since it was difficult for the operators to stop at the right point unless weights were about even. A similar elevator was built in the castle of Duke Charles of Lorraine about the same time, but this one was simpler, consisting only of a chair on a platform.

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LIGHTNING rods seem to a large extent to have passed out of favor of late. No doubt this is in a measure due to the sharp practices of the lightning rod vendor, who after securing the order cared but little whether the rod was put up in a proper manner or not. Mr. Thomas A. Edison, writing to the Popular Science News recently on this subject, says: "There is no doubt whatever that the lightning rods are a source of great protection when buildings are properly equipped with them. In doing this it is necessary to have good metal conductivity and a perfect connection with the earth at the bottom of the rod. If you refer to a book published by Sir William Snow Harris, who first introduced lightning rods into the British Navy and mercantile marine, you will find this subject discussed at length. Before the introduction of lightning rods in the British Navy, disasters were quite frequent, and the subject of protecting their ships from this element of danger presented itself in a very serious light to British naval officers. When Harris proposed equipping these ships with lightning rods, he was almost alone in the belief that they would afford such protection as was desired. After a great deal of trouble he succeeded in having them adopted, since which I do not think there has been a single serious disaster from lightning in the British Navy, which is conclusive that Harris's theory was correct. The same applies to buildings of inflammable nature erected on land, and when these are properly supplied with a sufficient number of lightning rods, dependent upon their size and the extent of ground covered by them, I believe they are absolutely safe from all danger." It is worthy of note that in New York City the electric wires and the metal so largely employed in the construction of large buildings, serve to attract and as it were absorb the electricity in the atmosphere, so that it has become almost an unheard of occurrence for a building in that city to be damaged by lightning. It is adduced in support of this theory that it is no unusual thing for the shipping in the harbor to be damaged by lightning.

METHODS OF PREPARING SPECIFICATIONS.

BY D. A. HEWITT.

MUCH has been said and experienced in the length of time it requires to draw a thorough and comprehensive description of the several things that go to make a complete specification. The drudgery could be lightened somewhat and delegated to a junior clerk who writes a good hand or can operate a typewriter, by a system of cataloging or cypher code alluding to the architect's private collection of choice architectural phrases.

In taking instructions from a client it is well to have a sheet on which to note the various and minor requirements which really enter into and form a very important part of the specification. By a judicious arrangement of the "Wants," this list may form a part of the specification skeleton, from which a concise and well arranged description is obtained for drawing the final specification. From the numerous pamphlets and books published on this subject, a good many clauses suited to the particular phraseology of the architect can be had, and from which he may make his book. The numerous clippings are most conveniently sorted into an "invoice" book, the pages of which are numbered, and an index of contents in the back aids a rapid search.

Each paragraph usually refers to but one item of the work, as "Strapping," "Casings," "Hardware," "Lathing," "First Coat of Plaster," or other things, according to the special department of work. The intention is to number the different paragraphs in each trade, as 25, "Strapping," 58, "Casings," and so on consecutively. A "skeleton list" of the aforesaid specification, giving the number and name of each paragraph, would assist the memory of the specification writer and be a check on the items that it should contain. When the architect is desirous of getting up a

specification for a new piece of work, he takes from his model specification a list of numbers (without names), and where special or altered clauses eventuate, he drafts them on separate slips of paper and makes a note of it on the list of numbers. The routine or stereotype of the matter can thus be obtained for the stenographer by the use of a string of numbers; the intention is not to use the skeleton numbers in the finished document.

Interlining of old specifications has its advantages, but so seldom is it that two jobs are similar that it entails considerable drafting of slips to apply in this case. The suggestion of model clauses or slips is better.

Another feature is noted in specification writing, that which might be called the "Construction Method." As the several items come on the works and are used, in the same order should they appear in the written document, and thereby save many omissions or the makeshift of an addenda.

In the carpenters' work, four subdivisions might be made, and classified as "rough work," "exterior work," "interior work" and "trimmings, with hardware." Some architects draw a carpenter's specification as a whole, without making any different headings or marginal references. This involves time and patience in hunting out any one item, unless the person looking for it is familiar with the make-up. Mechanics having to refer for guidance, experience difficulty in locating the desired information from the vague way the clauses are designated, and the length of paragraphs, covering several items.

On completion of the whole specification a frontal index page should give the contents of the several pages, thus:

Page 1 Excavate, grade, etc.
Page 2—Drains, weepers, filling.

For single items of reference, the alphabetical index of contents to the printed forms is easy of access, but does not always assist the architect so well as a list prepared on the construction method.

Each trade should have a slight reference clause drawing attention to one general set of conditions and time schedule, giving date of completion for each contractor, preceding the main specification. Thus, such features of the "Builders' Revised Contract" as do not coincide with the wishes of the writer can be straightened out as he may desire.

Frequent changes could be made from time to time in a model specification or system similar to the manner in which a filing cabinet can be used. The arrangement should consist of cards of tag board, 3 inches high × the width of foolscap, on which each paragraph is pasted. The numbers must assist in maintaining order. When it is found absolutely necessary to elongate a clause, or introduce a new one, and space is not to be had on a card, let such additional card bear the number of the paragraph or insertion, and be distinguished by letters, as No. 76A. or No. 76B.

In "setting up" for a specification, one would only require to pick out the clauses and add such changes by written slips, to convey to the stenographer the matter. Letter files or a desk drawer will easily contain this system, and be kept in order by the office boy after each piece of work has been written.

Cobalt green is fast to light and weather, and does not re-act with other pigments. Dilute acids do not affect it, but strong ones dissolve it, forming a blue solution. Alkalies have no action upon it.

MARBLE WORK.

By George H. Blagrove.

Statuary, carved ornament, mouldings and surfaces such are the principal uses to which marble can be applied in relation to architecture. There can be no doubt that the happy union between the natural and the ideal which was attained by Greek sculptors, and which rendered their creations at once so god-like and so human, owed much of its impressiveness to the pure white marble in which they worked. We have only to compare any single specimen of marble statuary with its plaster counterfeit to be convinced of this. Plaster being relatively opaque, it can give us nothing but reflected lights; whereas the more enduring material derives a flesh-like aspect from its translucence, combining the effects of reflection and refraction. The former material is death-like, the latter life-like; and when the milk-like surface of Carrara has been softened and mellowed by time, it has acquired a warmth assimilating it more closely to living flesh. There is no other material that can so well afford to be toned down as marble. Even when yellow with age, its surface is alive with minute scintillations of light. This is true in a greater or less degree with respect to many of our building stones, but it is pre-eminently so with white marble. These are the principal reasons why marble is so well suited for the highest purpose of the sculptor—the representation of the human figure.

In reference to statuary marble the technical name is happily suggestive of its noblest use—the important question arises, should sculpture be polished? The public who are afforded opportunities of inspecting ancient marble sculpture in museums, and modern work of a corresponding kind at the Royal Academy and elsewhere, have been educated into thinking of figure sculpture generally as unpolished. Modern specimens of polished work are to be met with occasionally; polished figure sculpture dating back some two hundred years or more, is more plentiful, and there are isolated examples of Greek and Roman production which retain their original polish almost unimpaired. But with these exceptions, it may be asserted that the best sculpture which the British public ordinarily obtain opportunities of seeing has either never been polished, or has so far parted with the polish it originally had, that it cannot now be said to possess any. Yet it is an established fact that not only the Greek and Roman sculptors of antiquity, but those of the mediæval period also, gave a very high polish to the nude portions of their statues. The same practice was followed in the Renaissance period, and Michel Angelo even went so far as to polish some portions of a statue more highly than others, so as to obtain high lights just where he wanted them. Yet modern sculptors are practically unanimous in discarding polish, rejecting in this respect, as we have seen, the traditions of their best predecessors in the art. Which is right, the practice of the moderns, whose art is but a thing of yesterday, or that which was undeviatingly followed in the best as well as the worst periods of art within the cognizance of history? The question is, as we have designated it, an important one; for the practice deemed right for adoption in relation to figure sculpture ought to furnish us with some principle for our guidance in dealing with architectural carvings generally. It behoves us, therefore, as architects, to determine which practice we intend to encourage, as occasions present themselves calling for our decision.

Professor J. H. Middleton, who contributes a learned and thoughtful paper on "Sculpture" to the latest edition of the "Encyclopædia Britannica," is strongly in favor of the ancient practice, which, he declares, "really suggests the somewhat glossy surface of the human skin very much better than the dull, loaf-sugar-like surface which is left on the marble by modern sculptors. Here we have an assumption combined with an assertion. It is assumed that we are justified in seeking to produce a realistic resemblance to the human skin, and it is asserted that polished marble goes nearer to produce this effect than if it was left unpolished. Accepting the doctrine that the aim of the sculptor should be to produce a resemblance to human skin, which we may well do without carrying realism too far, we may seriously ask ourselves, "is the skin glossy in its normally healthy condition?" We feel bound to confess that it is not so—certainly not more so than ancient sculpture whose polish has been dulled by time. The healthy skin presents a slightly-glazed surface only when it is tightly stretched over a bony protrusion, such as a raised shoulder or bent knee, and then its glossiness is softened by the minute down with which the skin is covered. The skin of a figure emaciated by famine or disease is often glazed, especially where it forms the only covering to the bones; but the dry skin of the healthy subject presents, on the whole a dull texture. One property, already noticed, which living flesh possesses in common with statuary marble, is translucence; but this property is largely nullified by polish. In so far as we increase the reflecting power of marble by polishing the surface, we reduce its absorbing and refracting powers, which constitute its translucence. Light, striking upon a highly polished surface, rarely penetrates beneath it, but is thrown off at once. Human flesh is soft, and how can the lights and shadows which fall upon polished surfaces present the same soft gradations of tone as those which rest upon smooth but unpolished surfaces? According to Professor Middleton, it is "much to be desired that modern sculptors should, to some extent at least, adopt the classical practice, and by a slight but uniform polish, remove the disagreeable crystalline grain from all nude parts of the marble." But we contend that, unless the marble is to be placed very close to the eye it is just the lustre of this crystalline grain which is so helpful in softening the abruptness of strong shadows.

If the absence of polish produces the effect of softness, its presence must suggest the contrary idea; and the hardness and closeness of surface produced by polish are surely associated in the mind with corresponding qualities in the mass of the material. This essential difference between the effect of a polished and an unpolished surface, places it in our power to produce striking contrasts of surface without the aid of color, some portions of a composition being polished, while others remain unpolished, there ought, however, to be no doubt in the mind of the artist as to when or where polish should or should not be employed.

If the reasons adduced against the polishing of nude statuary are held to be of sufficient weight, we are furnished with the outline of a principle which may serve for our guidance in the treatment of carved ornament generally. If it be the legitimate aim of the sculptor to follow nature as closely as possible in the counterfeit presentment of human flesh, then the surface of the marble should, in other cases, be made to resemble the surface of the object represented. Thus, while we should not apply polish to the nude figure nor to drapery, we might at once mark the distinctive surface-character of weapons, armour, or other metallic objects represented. Foliated ornament we should never polish; and indeed it is scarcely conceivable that any representation of an organic form should be so treated. We shall probably not go far wrong if we agree that polish may only be applied to representations of artificial forms, and not invariably then. If we adopt Mr. Ruskin's view, as expressed in the "Stones of Venice," that representations of artificial objects should be subordinated in sculpture to those of natural forms, it will necessarily follow, that in bas-reliefs or groups of carved ornament, the proportion of unpolished surface will always be in excess of that which is polished; and we contend that the best effect is produced when this excess is large. When we compare the soft gradations of shadow and light which become possible upon an unpolished sculptured surface, with the sharp and restless contrasts in which polished surfaces abound, it seems evident that the latter should occur only exceptionally. Its startling brilliancy will afford occasional relief to the softer masses of the unpolished work. But the principle of repetition should never be forgotten. As the painter repeats his colors, the musician his cadences, and the architect his forms, so should the sculptor or carver repeat his areas of polished surface, that none may appear isolated or singular.

There is a practical objection to be urged against applying polish to delicately carved work, whatever it may represent, which will commend itself to every architect. It is clear that we cannot rub the surface of marble without effecting a slight, if imperceptible, reduction of its bulk. What may become perceptible in the process is a modification of form, unless the polisher possesses equal skill with the artist who originally carved the ornament. We are informed by a foreign firm of marble decorators who have assisted in the production of works of the highest class, that they never undertake to polish a piece of carving after it has left the sculptor's hands, notwithstanding that they have a staff of highly-skilled art-workmen at their disposal.

Reference has been made to Mr. Ruskin's views upon the subordination of the artificial to the natural in sculptured representations. That such subordination is appropriate, and, indeed, essential in all sculpture which has a story to tell, is we think undeniable. But Mr. Ruskin surely goes too far in asserting "that all ornament is base which takes for its subject human work." There is no doubt that sculptured trophies which relate to obsolete rites and customs appear ridiculous when reproduced upon modern buildings. But this is only because they have no significance for us. Let the trophies bear a close relation to the aims or requirements of modern life, and their appropriateness will at once be recognized, provided that their forms are agreeable to the eye.

To treat exhaustively of the uses of colored marbles, in their application to architecture, would seem an endless task. It is easy, however, to define broadly the limits within which their uses should be confined. It is well for us to recognize that variety and brilliancy of color cannot successfully be combined with elaboration of form. Mr. Ruskin has somewhere given expression to this doctrine, illustrating it by a comparison between the swan and the humming-bird—the first exhibiting perfection of form, and the second perfection of color. The more we reflect upon the principle inculcated, the

more we are convinced of its truth. It is evident that the full appreciation of form depends upon contrast. It may be a contrast of light and shade upon one material, as in the case of a bas-relief, or a band of carved ornament; or it may be a contrast between the colors of two different materials, as in the case of a statue enshrined in a niche; but in either case there are only two colors or shades to be broadly contrasted—the introduction of a third would weaken the effect. The sharpest accentuation of form is obtained by projecting white against black, or black against white; and this can be exemplified in reference to marble inlay or mosaic. The most feeble presentation of poses which are intended to be strikingly effective, may be seen in the "tortuous attitudinising" of harlequin in his variegated costume, the brilliantly contrasted colors in which quite distract attention from the form which it covers. If the man were arrayed in one color, we should distinguish his figure clearly against a suitable background. It follows that if the forms of architectural details are to be shown to advantage, they must be executed in uni-colored marbles. No cornice or other group of mouldings can exhibit its lines in their full meaning when their contiguity is traversed by the irregular markings of a variegated pattern. It is safer to reserve the variegated marbles generally for use in large masses of plain surface only, where there is no form to be impressed upon the eye except that of the outline. Even veined marbles should be employed with caution for architectural features. It was the opinion of Sir William Chambers that marble columns should not be fluted; and this was due to the feeling that the breadth of a veined surface ought not to be interrupted with sharp vertical lines.

Another point to be observed in connection with marble work is that all delicate mouldings, and sunk or raised enrichments, should be executed in marble of light color, if not white. Slight shadows and subtle gradations of light are overwhelmed by a depth of strong color. Dark-colored marbles require very bold treatment to give any appreciable emphasis to high lights and depths of shadow. Those who have been accustomed only to designing ornament in white marble, freestone, wood or plaster, will find themselves at fault unless they adopt a fundamentally different method in dealing with such a material as Ashford, or the dark green serpentine of Letterfrack, which, though not strictly a marble, is used and regarded as such by marble decorators. The mouldings and enrichments most effectively executed in dark-colored marbles are those of abrupt contour, which admit of sharp, concentrated high lights, and depths of shadow undiluted by reflection. Polish intensifies the depth of color when not exposed to direct light, while it increases the brilliancy of high lights. This is why polish should be applied, by preference, to dark-colored rather than to light-colored marbles. It is upon plain surfaces, however, that polish comes most into requisition, as in wall-linings and dadoes, and the boxed enclosures to iron construction, to which marble is most extensively applied in modern work. It may, and indeed has been objected against the practice of veneering with thin slabs of marble, that the result is only to produce an elaborate sham. But everything depends upon how the veneering is done. If slabs of marble are affixed to a wall in such a manner as to break joint, the joints at the external angles being concealed in mitres or in quirks of beds; if steps are formed with treads, risers and spandril ends of the same material, the very veins and patterns of the marble being so arranged that they shall run in unbroken continuity from one slab to another; if, in short, every effort be made to deceive the spectator into imagining that the thin slabs are really solid blocks of marble, then the whole composition is a sham, and is utterly offensive to good taste. But if, on the other hand, the designer simply sets himself to produce pleasing decoration, instead of trying to imitate construction which does not exist, he will boldly confess that his decoration is only a casing, and does not pretend to be anything more, and his wall-linings will not be confined to the tiresome regularity of equal-sized slabs, breaking joint; but he will consider himself free to use panels of forms which bear no relationship to solid masonry, being merely beautiful in themselves; and his external angles may be treated with mouldings in a different material from the wall-linings, which they could not be if the whole were required to be an imitation of solid work. He will case up a girder with panelled soffit, side architraves, and moulded string courses above, all in marbles of different colors, because he does not wish to counterfeit a solid marble beam carried over an impossible bearing; and he will follow a similar principle in enclosing an iron stanchion. The Venetian architects of the Romanesque period treated the art of marble veneer upon sound principles, honestly exposing the edges of the slabs, which they often decorated with simple nail-head enrichments.

There is one caution to be observed in the use of colored marbles, and that is not to employ too many colors. Of course this applies to every kind of decoration into which color finds admittance, but in dealing with marble the temptation is too often to revel in a variety of stones. Brecciated marbles of large pattern find their place only in panels of proportionate size, in which the beauty of the material is fully exhibited, suitably framed. An adjacent panel, if smaller, may often be filled with the same breccia, taken from another part of the bed which is found to furnish the same pattern on a smaller scale. Thus may a frequently recurring difficulty be surmounted without the necessity of resorting to different marbles for small panels. With uni-colored marbles, perhaps the richest combinations may be formed with crimson griotte, jaune Lamartine, dark green porphyry, Cardiglio, and the pale green campan, with the addition of black and white. We can scarcely indicate any that are uni-colored within the strictest acceptance of the term, but in those that are ordinarily so styled, the markings are so small and subdued, that they do but serve slightly to tone down the prevailing color. Hence it is that absolutely pure primary colors are not obtainable in marble decoration, and hence arises the importance of preserving clearly defined contrasts between the stones selected, avoiding any two between which a modified resemblance subsists.

In putting the plate glass front in the new Thomson block at Vancouver, the usual supporting post at the corner was dispensed with, and the ground edges of the glass clamped together. The front was designed by J. W. Mitchell, and the work executed by the Vancouver Plate Glass Co. This method has also been adopted in a new store front on King street west, Toronto.

Mr. Ryan, of Smith's Falls, contractor for the Carleton Place town hall, has brought suit for damages against one of the sub-contractors, Mr. Wm. Willoughby, of Carleton Place, who, being a member of the town council, was obliged to relinquish his contract owing to the refusal of the council to accept his resignation as a member of that body.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Height of Ceilings.

In this northern climate, where the air is full of oxygen, ozone and other life-giving qualities, high ceilings are not so necessary for the maintenance of good health as the climates of more southern countries. The matter of heating our domestic buildings is one of considerable importance to every householder, and if economy, and health, and comfort can be procured without a violent sacrifice of good taste, he will generally embrace the opportunity of acquiring them. To heat a room of any given size, having a ceiling fourteen feet high costs considerably more than to heat one having a ceiling only ten feet high, and the air in the latter room will be as pure and as health-giving as that in the former; indeed, it is claimed by some scientific men in England that a low ceiling is the healthier of the two and is advocated as really affording better ventilation throughout, in preventing the formation of upper strata of all but immovable foul air, and tending to prevent draft. From an artistic point of view, low ceilings have an important value, as the furniture placed in them is not dwarfed by the height of the apartment, and they possess a cosiness which in a high ceilinged room is sacrificed to emptiness. In the reign of Good Queen Bess low ceilings and wainscoted rooms were the rule, and comfortable interiors, rather than imposing exteriors were the qualities sought for by the middle classes.

Pressed Brick in Fronts.

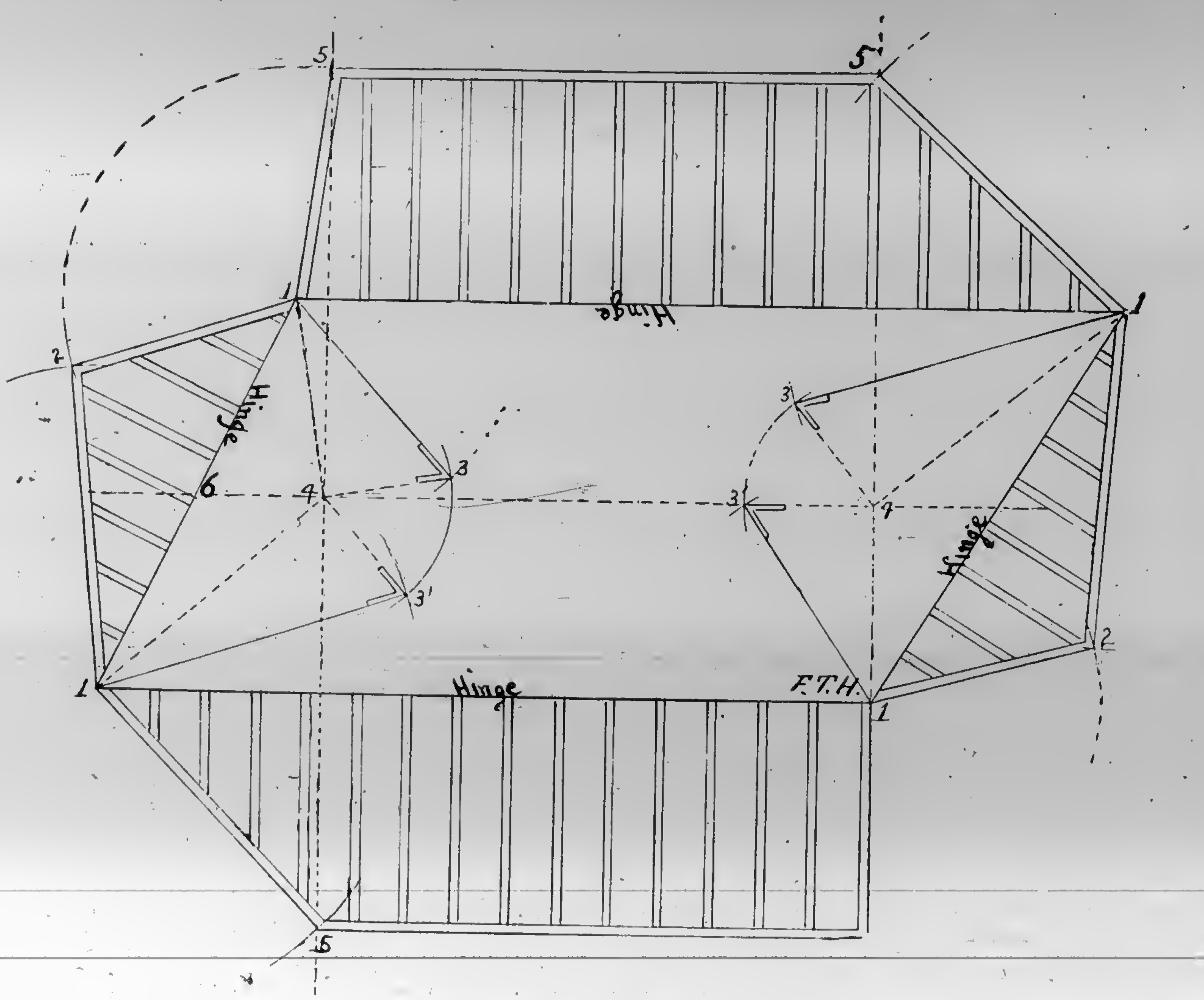
There is no branch of the bricklayer's art which requires more attention, and to be thoroughly understood, than that of pressed brick face work, which is becoming more and more in demand in this country. The many forms of pressed bricks, or terra cotta, that may now be obtained from the yards of our Canadian makers, enable our architects and designers to produce very effective work in brick. There is no beauty of detail or of design on a small scale that may not be obtained by the use of moulded bricks, and they are in themselves far more durable, and, if carefully burned, retain their sharpness of outline longer than most kinds of stone. The bricklayer of to-day, if he desires to be considered a proficient workman, should study and cultivate a taste for ornamental brickwork, and when an occasion is opportune for him to practice this branch of his art, he should do so with a knowledge of ornamental effect, and of the nature of the materials he makes use of; and he should perform his work in a skillful and careful manner. It takes time to lay pressed bricks properly, and those for whom the work is done should understand that to rush pressed brickwork is to spoil it. The effect of pressed brick fronts depends to a considerable extent on the color of the mortar used and its distribution, the best effects resulting from the use of mortar colored the same as the bricks. This is particularly true of a buff front, where colored mortar, red, black or brown, makes too much of a contrast to be pleasing to a refined taste. A buff front with light brown mortar and light stone trimmings form a fairly pleasing combination, but a much better effect is obtained with buff or white mortar and light grey stone trimmings. Dark red or terra cotta bricks may be laid in red, black, or grey mortar with nearly equal effect, but, as a rule, red or black are preferable, with red or blue stone trimmings. Mortar joints should be uniform in thickness, and should never exceed a thickness of three-sixteenths of an inch. The bond on the face should be perfect, the headers, stretchers and closers placed in regular order, and the face kept flush and plumb in every direction and well tied to the backing wall.

Designing Pressed Brickwork.

It often happens that the builder is called upon to design a brick mantel, brick porch, or other similar work, for which no design or drawing is available to suit the conditions. In such a case, any builder endowed with a fair share of ingenuity and skill should be equal to the occasion. Armed with a manufacturer's illustrated catalogue and price list, he can easily choose his plain, moulded and ornamental bricks, ordering just the number required to complete the work, making of it a matter of economy as well as a pleasure in having made a design he knows is original. Indeed, we have seen pressed brick mantels built from designs furnished by the working bricklayer that were superior in design, detail and combination to many of the crack designs sent out as specimens by the manufacturers in their catalogues and circulars. A handsomely designed pressed brick mantel forms quite a taking feature in a dining room, hall or billiard room, and gives an appearance of cheerfulness to one, cosiness to another, and a pleasing welcome to the third. Frequently a few glazed or enamelled bricks can be introduced into a design with good results, in panels, or in relieving courses under moulded bricks, but their use must not be of too generous a nature, or the work will drift into gaudy vulgarity. There is a difference between "glazed" bricks and bricks that are "enamelled." The first is made by covering the raw brick with a "slip" and afterwards applying a coat of transparent glaze resembling glass, while the true enamel is made by fusing into the clay without an immediate coating, and the enamel is opaque in itself. These bricks may be obtained in almost any primary or secondary colors. Pressed bricks are more uniform in size than common bricks, but, as the

shrinkage is unequal, they should be assorted for very fine work and each size worked in the wall without mixing other sizes with it. This relates rather to the thickness of the bricks than to their length or breadth. Pressed bricks also differ in shade, some being much darker than others, and in assorting for size it is just as well to sort for color, and when laying to use the largest pile for face wall and the lesser piles for plinths, belting courses, corbels or other similar work, though, as a matter of fact, a building may be made quite handsome and bright by mixing the shades together in the wall if the work is artistically done and the shades properly grouped; but this implies a knowledge of color harmony not usually possessed by the ordinary bricklayer. Under no circumstances should pressed bricks be laid dry, as the mortar joint is so thin that the moment a dry brick touches it the moisture is absorbed and the mortar rendered inert. In hot weather it is impossible to get the bricks too wet, but in freezing weather less wetting will answer, but the bricks should be made warm before laying. It is much better not to lay bricks in freezing weather when it can be well avoided, but when it is imperative the wall should be covered every night with straw and boards, or better, with heavy horse blankets, and it is well to add about one-third in bulk of Portland cement to the mortar, which will make it quick-setting and prevent damage from frost. It is necessary that the surface of the bricks be free from ice and snow and perfectly clean when laid, as dirt or a frozen surface will prevent the mortar from adhering to the bricks, leaving the wall weak and unstable.

Irregular Hip-Roof Framing. We have been frequently confronted with queries regarding the framing of "hip-roofs" having irregular sides, and in order to satisfy some of these queries the following diagram and explanations are given herewith: Let 1 1 1 1 be the base lines or ground plan; 6 4 height of roof to top of ridge pole. Connect 1 4 as shown at each corner. Square out to 3 on each line; make 4 3 3, which gives the height of elevation. Connect 1 3, which is the length of hip rafters. Square out from 4 to 5, 5 5 5; then take the distance 1 3 in the compass, with 1 as a centre, describe the curve cutting line 5, and again take 1 3, which is the shorter hip, and with 1 as a centre describe the curve cutting line 5, and bisecting the curve 5 to 2. Connect 5 1 1 2 2 1, and 1 and 5, and the figure is complete so far. This gives length of hips in position. This applies to either or to both ends of the roof, each being of like shape and proportions. Place the jack rafters or cripples at the domed spaces and the work is done. To make model: Draw the figure on cardboard the exact shape of the roof as shown, to any convenient scale, then cut the board nearly through with a sharp knife on the lines marked "Hinge," which are the lines of the wall; stand up the wings, or sides of roof showing lines of jack-rafters, until all the angles come together, and the shape of the roof will be complete. The lines at "Hinge" may be cut through, and a piece of thin cotton cloth pasted on will allow the wings to turn up easily and will protect the joints as well. The bends for the plumb cuts of the rafters are shown at 3 3 3 3.



Development of Hip-Roof.

Backing for hips may be obtained by any of the usual methods.

Chimneys. In estimating the cost of chimneys, the size of flue and thickness of wall must be taken into consideration; but where these conditions are defined the cost may be easily determined, the total height being known. Suppose a chimney to have a flue 4 × 8 inches with one thickness of brick outside. This will require 25 bricks to the running foot in height, and at the present price of labor and material, will be worth 75 cents per foot to furnish materials and labor and erect. Thus, a chimney 25 feet high will cost for bricklayer's work, $18.75. This, of course, does not include foundation or necessary carpenters' work. Chimneys having flues 8 × 8 inches require 30 bricks to running foot, and are worth 85 cents per foot to build. When the flue is 8 × 12 inches, 35 bricks are required for each running foot and cost of building will be 90 cents per foot. Chimneys with flues 12 × 12 inches require 40 bricks per foot and cost $1.05 per foot. A two-flue chimney—one flue 8 × 8 inches, the other 8 × 12, requires 56 bricks to foot, is worth per foot to build, $1.40. Two flues 8 × 8 inches, 45 bricks to foot, is worth $1.30 per foot. Chimneys having three flues, 8 × 8, require 66 bricks per foot, and are worth $1.60 to build. A chimney with two flues 8 × 8 inches and one 8 × 12 inches requires 75 bricks per foot, and is worth to build, $1.90 per foot. The cost of chimneys with any number of flues may be found by using the above as a basis to work from. Chimney breasts require about 95 bricks per foot in height, and is worth about $2.10 per foot to build; but if the chimney is in a corner, and the breast runs diagonally, the cost for labor will be increased at least 25 cents per foot. If there is a fire-place, and a grate to set, and a throat to make to flue, the cost will increase to $2.50 or $2.75 per running foot. These prices, of course, are for common bricks; if pressed or ornamental bricks are introduced into the work, 25 per cent. over and above the extra cost of bricks must be added to the cost. If ornamental tops are added to chimneys, extras must be charged to cover extra labor and extra cost of materials. There is no provision made for scaffolding or for colored mortars in the figures presented. Where these are necessary, their cost must be added to the figures given.

MONTREAL BUILDERS' EXCHANGE.

The first annual meeting of the Montreal Builders' Exchange took place in the rooms of the Exchange, 204 St. James street, on Monday, December 12th. A large number of the members were in attendance. The directors presented their annual report, as follows:

Gentlemen,—In presenting to you our first annual report of this organization, we do so with a feeling of satisfaction at the progress and growth we have experienced and which, if not quite up to the expectations of some of the promoters, is on the whole most gratifying.

There are a number of our members who constantly make use of the rooms and its privileges, and they have done so because it has proved beneficial to their business interests,—the privileges afforded and the benefits derived have proved an ample return for the membership fee; on the other hand it is a source of regret that a number of our members have failed to take that active interest in furthering the objects of the exchange that they should do. We felt justified in starting the Builders' Exchange on a membership of 40. The roll has steadily increased and we have now 113 members in good standing.

Your board appointed a committee on admissions, composed of the following names: Messrs. J. W. Hughes, Thos. Forde, C. W. Trenholme, W. T. McLaurin, J. H. Hutchison, Jas. Paton, Jno. Wighton. These gentlemen have performed their duties to the entire satisfaction of the board.

Your board elected the following names as honorary members: Messrs. Danl. Wilson, Robt. Weir, Moise Martin, Hy. Bulmer.

In order to interest and instruct our members your board made an effort to get some of our members to read a paper on some subject and Mr. Hughes kindly consented to do so, and presented a most instructive paper on the value of organization, at which a number of our members were present.

Conforming with a resolution of the board a letter was sent by our secretary to all the prominent insurance companies, monied corporations and Montreal City Council, real estate owners, federal and provincial governments, etc., protesting against the importation or encouragement of alien contractors and labor.

A letter was also received from a firm of architects complaining of delay they experienced in contractors neglecting to send in tenders in proper time. A copy of the letter was sent by your secretary to all contracting firms who were members.

A letter has been written to the city clerk in regard to the new building by-law, asking for information and what progress was being made towards its adoption.

Your board has instructed its legal adviser to apply for our charter; as this has to be obtained through the council of the local legislature, and as this body has not met since the date of our organization, we have not been able to take any steps in regard to the matter until the present time. The notice of application appears in the papers this week.

Our reading table has been well patronized, and the matter supplied for mental improvement has been greatly appreciated.

Your board, in accordance with the by-laws, has had to post the names of eight firms for non-payment of dues.

It is our sad duty to record the death of two members, viz., W. M. Briggs and F. W. Horton.

In conclusion, your board would most strongly urge on the members the necessity of greater co-operation and to come forward and assist their incoming board in furthering the general interest of our exchange.

Messrs. Chas. Trenholme and James Robinson were appointed auditors. They have kindly gone through our secretary-treasurer's books and we will now have the financial report for the past year, certified by them.

STATEMENT OF RECEIPTS AND EXPENDITURE. 1898.

RECEIPTS.

105 annual subscriptions @ $15	$1,575 00		
2 semi-annual subscriptions @ $7.50	15 00		
Rent of drawers	27 00		
			$1,617 00

EXPENDITURE.

Expense account, 11 months	$378 75		
" " clerk, 11 months	180 00	558 75	
" " rent, "		366 63	
		925 38	
Furniture account		384 94	1,310 32
			306 68
Balance in bank			306 68
Stock account,			
Furniture account	$384 94		

Dec. 9, 1898. Audited and found correct,

C. W. Trenholme } Auditors.
James Robinson }

After hearing the directors' and secretary-treasurer's reports for the year, which were considered highly satisfactory, a motion was unanimously passed that the same Board of Directors remain in office for the ensuing year. A vote of thanks was also unanimously accorded to the board, the Committee on Admissions, the auditors, and to Mr. George J. Sheppard, the Hon. Secretary-Treasurer, for their efforts in the interest of the organization.

The board is composed of Messrs. James Simpson, President; C. T. Williams, Vice-President; Peter Lyall, Amos Cowen, John McLean, F. Fournier, W. P. Scott, Directors, and Geo. J. Sheppard, Hon. Secretary-Treasurer.

SANITATION · HEAT · LIGHT

VENTILATION OF HOUSE DRAINS.

THE following is a report by Dr. Unna, the ~~municipal~~ engineer of Cologne, on experiments made upon the necessity of fixing secondary ventilating pipes for house drains, and the consequent circulation of water and air in the same :

At the meetings of the commission which has recently been considering the revision of the Cologne police regulations referring to house drainage, doubts were expressed as to the soundness of clause 9 of the old regulations. This clause was worded as follows : "Each fall pipe must be continued in the same width, and if possible without a bend, until it reaches right above the roof. The upper points of the siphon joint are to be connected with this pipe for the purpose of ventilation, etc., in order to avoid the failure of the water seal. If more than two floors are drained into one fall pipe, then a separate ventilating pipe of at least 1¼ in. diameter must be provided, and this must be connected with the highest points of each siphon."

Apart from the fact that simplicity of construction is the guiding principle in the execution of house drainage works, the use of secondary ventilating pipes becomes positively dangerous if the installation is at all badly executed, because these pipes are soldered at such a number of points, any of which may not be tight enough to prevent the escape of sewer air. Besides, the more the installation is simplified, the cheaper it becomes.

The general method in Cologne was to use zinc pipes of a diameter of 1¼ in. The diagonal and longitudinal seams of these were either soldered badly or, as frequently happened, they were not soldered at all. The connection with the highest points of the siphons was made by lead pipes having an inside width of 4 in. The latter were often soldered blind, so that at least a continuous escape of sewer air was avoided. A careful examination of these connecting pipes proved that they were quite stopped up with grease, coffee grounds and cobwebs, thus fully justifying the doubts expressed by the commission. A radical charge is required with regard to this point. Those who were in favor of the retention of the by-law quoted advocated the insertion of a clause stipulating that the secondary ventilating pipe, as well as the pipe connections with sewer, should be made of lead or iron of an inner width of at least 1¼ in. Others argued that ventilating pipes were not necessary at all, because the siphon could not be exhausted even without them. In consequence of the great importance of the question of house drainage, the police found the money for a series of exhaustive practical experiments dealing with this matter, and instructed Mr. Maniewski, a police architect, to make same.

It was of great interest to me to join Mr. Maniewski in these experiments, as I had already instituted similar enquiries which served me as a basis for a paper on the laying of house drains, with special consideration of the hygienic significance of sewer air in connection with the same. This paper appeared in the Gesundsheitsingenieur, Nos. 23-24, 1895. As the trials were confined to the laboratory only, I experimented with narrow glass tubes. Our joint experiments were to cover a larger field so as to decide not only the value or otherwise of secondary ventilating pipes, but also various open questions, as, for instance, the movement of air and water in the drains, and so forth. For this purpose we erected a wooden frame (Fig. 1), about 32 ft. 6 in. high and about 25 ft. wide, divided into three equal storeys of a height of 9 ft. 10 in. The fall pipes were fixed on the perpendicular wall with hoop-iron clasps. The trial conduit consisted of a level main pipe, into which a sliding valve was inserted behind the junction of the first vertical fall pipe. (For gradients of the main pipe see later on.) This first fall pipe was carried right above the frame, and three closet pans were connected with it. In the ground floor another flat-laying pipe branched off from this fall pipe. On to this fall pipe also three closet pans were connected, placed behind each other a distance of 3 ft. 3 in. apart. The main pipe ended in a similar vertical pipe, which was also continued upwards right above the structure. Glass tubes of the same diameter as the inner diameter of the fall and main pipes were inserted into these at each floor.

In order to investigate every possible combination of systems and dimensions which are met with in practical work, the following points had to be considered : (1) width of drains or main pipes ; (2) width of sewage pipes ; (3) width of siphon connection of closet pans ; (4) depth of water seal ; (5) diameter of sieves in the sinks or pans ; (6) distance of pans from pipes ; (7) fall of the flat-laying sidewards connections ; (8) effect of enlarging, narrowing or closing pipes at their upper ends ; (9) result of fixing or omitting a main intercepting trap ; (10) the working of the latter on pans when connected with a pipe which is subject to sudden and copious flows of water, such as from roof gutters, bathroom pipes, etc. ; (11) effect of w.c. siphons on a pipe.

Before treating with the results concerning experiments of the working of the siphon valves against emptying of the pans by suction, a few remarks may be made referring to the observation of the movement of the water and the air in pipes and drains. These movements could be observed very clearly through the glass tubes above mentioned. During my former experiments with narrow glass tubes I could always observe that whenever a pan was emptied into a pipe a solid column of water piston was formed, which had on the water seals above and below an effect similar to that of the piston of a pump, and consequently they were broken—i.e., emptied by suction. This now only took place when flat-laying pipes or pipes which were closed at the top were used. In pipes open at the top, the water coming from pans laying sidewards of the vertical pipe was distributed in the following manner : First, it fell against the opposite side of the pipe, then it dissolved itself into single threads, and finally descended along the sides of the pipe in spiral form (Fig. 2). The number of these threads increased in the same measure as the influx of water increased. This process went on working gradually towards the centre of the pipe, until finally the whole was filled with these water threads. This distribution of the water in the shape of single threads explains the large quantity of air which accompanied its fall, as some air particles were carried along on the surface of each thread. In order to gauge the volume of this air, we inserted into the top of the pipe an anemometer of the same diameter as the pipe. The air had to pass through this instrument. It was then seen that a bucket of water (3.3 gallons) carried with it from four to six times that quantity of air, according to the rapidity of the flow. When four buckets of water were thrown in in quick succession, the quantity of air drawn in equalled 110 gallons. If the water was thrown in vertically from above, then parallel vertical threads were formed. This experiment was made with a second pipe 4 inches in diameter, and in this pipe about 50 per cent. less air was carried down with the water. There appears, therefore, to be greater force of suction with narrower pipes, especially when the inflow comes from the side. There was no change noticeable if the pipe continued upwards in about the same width. If the added piece had only about half the diameter, the water threads thickened, and the water in the side connections commenced to oscillate strongly ; this movement increased until these connections were emptied by suction. When the top of the pipe was stopped up, no water threads formed at all.

Small quantites of water in a wide pipe simply ran down along the sides ; by larger quantities of water a water piston was formed, similar to those noticed by me formerly in the glass tubes, which emptied the connections (by suction). The water flowing in the main drain did not show a level surface—it was more like a

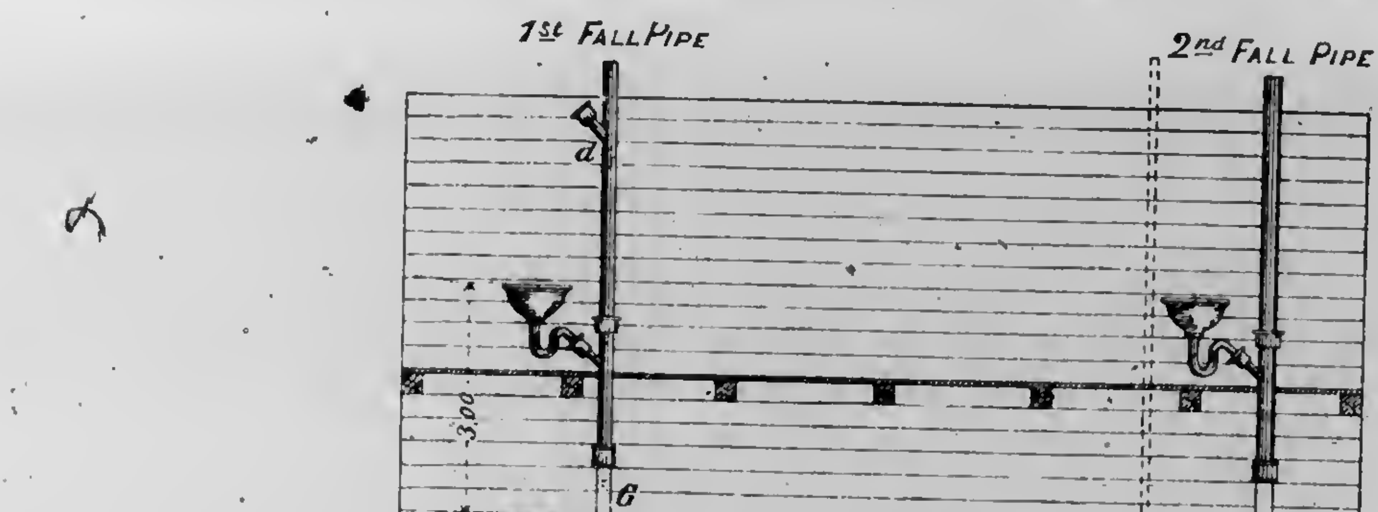


FIG. 1.

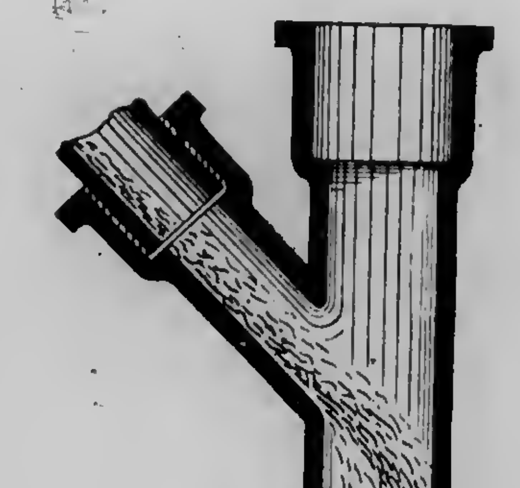


FIG. 2.

half moon (Fig. 3). This is accounted for by the friction of the water near the sides of pipe, which caused the particles of water nearest to move not so quickly as those in the centre. In the narrower side line (2 in.) the same observation was made, only with this difference, that the inflow of larger masses of water immediately caused the formation of a piston, and in consequence the emptying of the connections. The smaller pipe was cut open at the end and carried up vertically (Fig. 1). Here the same phenomena were observed. This pipe acts just like a main line of smaller dimensions.

No principal main interception trap was used in later experiments with syphons, since the use of the same is probibited, and rightly so, by the new Cologne police regulations. Yet a few experiments were made on account of the great effect such a contrivance has upon the movement of both water and air in drains. When the trap was removed from the principal syphon, and a strong inflow of water equal to a medium rainfall was let into the second fall pipe, it was shown that the water rose in the principal syphon up to the top ridge, and a current of air ensued which could clearly be felt one yard above the open syphon, even when the first fall pipe was open at the top. When the main trap was closed, the current of air became strong enough to constantly break water seals which had a depth of 1½ in. It was even noticed that particles of falling water in the fall pipe were thrown up by this current. At any rate, these trials proved that the omission of the main trap facilitates the proper discharge of water in the house drains. Another question of the utmost importance in connection with the experiments described below was to ascertain the limit at which siphons were self-cleansing, as, though an increase in the water seal diminishes the danger of its being rendered useless by suction, experiments with siphons which are not self-cleansing are of no value. The maximum depth of the water seal depends upon the rinsing power sufficient to render the siphon self-cleansing. In order to ascertain this limit, experiments were made with siphons made of glass, of different widths and of different depths of water seal. The whole of the bends (see Fig. 4) was filled with slimy sand, after which water was let into the pan so as to give about 16 in. over-pressure. The diameter of the inflow on the sieve was taken equal to 50 per cent. of that of the siphon. What always happened was this : The water broke through at the upper part of the lower bend of the syphon, a, thus creating a strong current which carried away the rest of the sand. These experiments led to the following conclusion : Siphons of 1½ to 2 in. diameter proved self-cleansing up to 4¾ in. depth of water seal, siphons of 2½ in. diameter up to 2⅙ in. of water seal.

Siphons made of glass were used in these experiments, as already mentioned. The usual lead or iron siphons have, of course, not such smooth interiors as these, and therefore a depth of 4 in. may be taken as the average limit.

A word might be said about experiments made to determine what time expires before an ordinary siphon lets sewer air into the rooms owing to evaporation of water contained in it. For this purpose four glass siphons of 1½ in. and 2 in. diameter, and 2 in. to 4 in. depth of water seal, were set up in a medium temperature of 68 deg. F. They all showed an average evaporation of 0.4 in. per week. Therefore it would take 10 weeks to break a water seal of 4 in. by evaporation. The evaporation was reduced to 0.6 in. per week if a flannel cloth saturated with oil was inserted above the sieve opening of the pan. In this case a 4 in. seal would therefore be broken in about 16 weeks. A nearly similar result was obtained by pouring about a wineglass of oil into the pan. This shows that a house is quite safe in this respect during an ordinary holiday's absence. In order to be absolutely safe, it is only necessary to open the siphons and to fill them with glycerine.


FIG. 3.

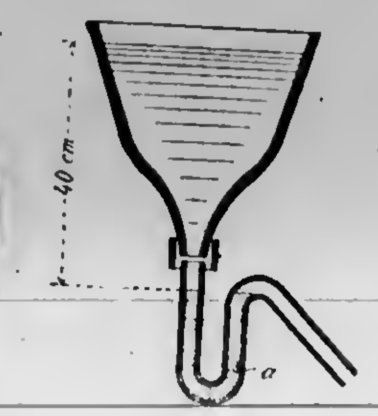


FIG. 4.

We will now describe more minutely the siphon experiments on the vertical fall pipe at which the above-mentioned data were taken into consideration. The main drain, a b (Fig. 1), consisted of 5 in. pipes with a fall of 1 in 50. That was considered the lowest fall allowable. The first fall pipe, c d (Fig. 1), was 2 in. wide ; afterwards one of 2½ in. width was used. The width of the siphon and siphon connections was 1½, 2 and 2½ inches, so that with the 2 in. fall pipe, 1½ in. and 2 in. siphons were used ; while with the 2½ in. pipe, 2½ in. siphons were connected in addition to the former.

The 1½ in. siphons had water seals of 1½, 2⅓, 3¼ and 4 inches, while the depth was 2⅓, 3¼, 4 and 4¾ inches at the 2 in. and 2½ in. siphons. These combinations were tried with the various widths of pipes described above. One siphon of each size was made of glass.

In order to accurately observe the movement of the air—i.e., thickening or thinning—an opening was made at the highest point (see Fig. 5). This was corked, and an S-shaped 0.39 in. glass tube was inserted into it. This tube was 1 ft. high. Behind it was fixed a sheet of paper, ruled off to a scale, the zero point of which lay exactly in the middle of the tube. The tube was filled with water up to zero point.

In order to determine the diameter of the sieves, 0.2 in., 0.24 in., and 0.32 in. was fixed as width for the holes, and after measuring several samples current in the trade. The number of the holes varied very much, and their superficies was from 10 to 50 per cent. of the diameter of the opening. This appears at first sight impossible. The following table, however, explains it :

Diameter.	Width of hole 0.2 in.	0.24 in.	0.32 in.
1½ in.	63 holes	45 holes	25 holes.
2 in.	98 holes	70 holes	39 holes.
2½ in.	1,166 holes	118 holes	66 holes.

0.325 in. was used for the experiments as being the least favorable for the seals. According to the above table a 0.32 in. sieve would have, with an opening of 1½ in., 2 in., and 2½ in. diameter,

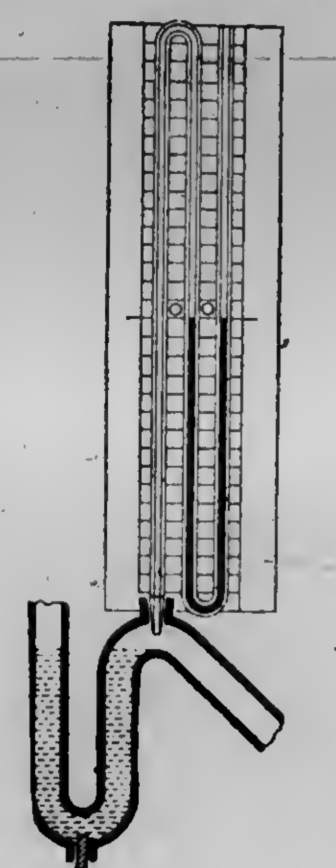


FIG. 5.

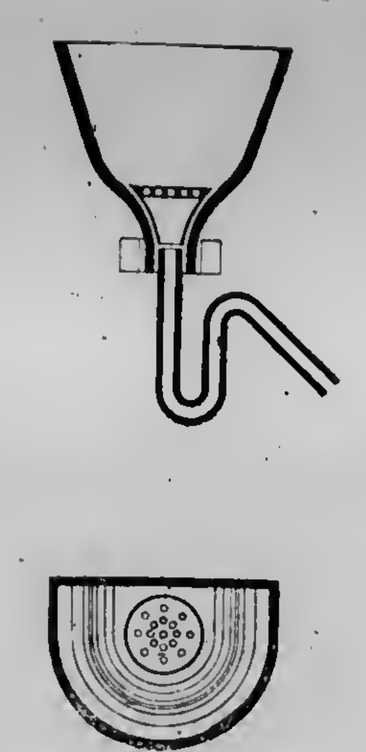


FIG. 6.

a 2¾ in., 3½ in., and 4¾ in. diameter, and 25, 39, and 66 holes respectively. These sieves were made of zinc and shaped like the rose of a watering pot, and were inserted as required into the lower part of the pans (see Fig 6). The opening which the latter were intended to close during the experiments was blocked with a piece of wood until the most favorable diameter was discovered.

In every experiment referring to the distance of pan from fall pipe the siphon was connected direct on the fall pipe branch by the insertion of a piece of the same diameter as the siphon, and also by a piece of the same diameter as the fall pipe by means of a reduction piece, so that in the latter case the distance from fall pipe to pan was 3 ft. 3 in. In order to ascertain what influence either the closing, widening or narrowing of the upper prolongation of the fall pipes had on the state of the water seal, every one of the above-described experiments was repeated, with the addition of a correspondingly wide top piece. All possible cases of inflow were tried by pouring the water into the upper, middle or lower pan, either singly or together, in every conceivable variation and by observing at the same time the action of every one of the three seals. From one to three or more buckets holding 3.3 gallons each were thrown in at one time (see later). At the last experiment of each series it was also determined in which way the widening or narrowing of the upper part of the fall pipe influenced the water seal of the siphon, and it was found that while a widening of the fall pipe had no effect upon the movement of the water contained in the siphon, on the other hand, a narrowing of the top piece gave unfavorable results. The principle of carrying every fall pipe in the same width right above roof must therefore be maintained. It is, however, preferable to make the top piece a little wider, so that an opening equal to the diameter of the original pipe still remains in the winter, when the same is liable to be partially stopped up by hoar frost settled along the rim.

If we now summarise the result of the experiments made with a vertical fall pipe, with three pans connected above each other, we arrive at the following conclusions :

If a secondary ventilation of the pan siphon is to be omitted, the following points must be observed : (1) The diameter of the fall pipe must always be greater than that of the water seal. A 1½ in. diameter of water seal corresponds with a 2 in. diameter of fall pipe (minimum) ; by 2 in. diameter of the former, 2½ in. minimum diameter of the latter is required, and so forth. (2) The water seal must be fixed immediately below the pan and connected either direct to the branch piece (which must be of the same width) without any connecting piece or with a branch piece of the same width as the fall pipe, and with a connecting piece of the next higher width of pipe of at least 2 in. diameter, fixed direct to the siphon. (3) The depth of the water seal must be 4 in. (4) The total of the openings in the pan sieves must not be more than 50 per cent. of the free diameter of the siphons underneath. (5) Every fall pipe is to be carried past the roof vertically, and, if possible, without a bend ; but it is better starting, say, with a width of 2 in. below the roof, to add 2 in. of diameter from there. It should project at least 4 in. above the roof, and should

EXPERIMENT I.—VERTICAL 2 IN. FALL PIPE WITH PAN CONNECTIONS SPACED 9 FT. 10 IN. APART.

Branch.	Diameter of siphon.	Depth of water seal.	Emptied by suction.	Results.
(a) 1½ in.	1½ in. direct on the fall pipe.	1½ in.	At sieve diameter = $\frac{7}{25}$ of siphon diameter.	Can only be used by 4 in. depth of seal and ½ sieve diameter.
		2⅓ in.	" " = $\frac{10}{25}$ " "	
		3¼ in.	" " = $\frac{13}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$ " "	
(b) 1½ in.	1½ in. and 3 ft. 3 in. connecting piece of 1½ in. diameter.	1½ in.	" " = $\frac{7}{25}$ " "	Must not be used without a separate ventilating pipe.
		2⅓ in.	" " = $\frac{9}{25}$ " "	
		3¼ in.	" " = $\frac{10}{25}$ " "	
		4 in.	" " = $\frac{13}{25}$ " "	
(c) 2 in.	1½ in. with small pipe of 2 in. to 1½ in. direct on fall pipe.	1½ in.	" " = $\frac{10}{25}$ " "	Can only be used with 3¼ in. depth of seal and ½ diameter of sieve, but preferably with 4 ft. depth of seal.
		2⅓ in.	" " = $\frac{15}{25}$ " "	
		3¼ in.	" " = $\frac{15}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$* " "	
(d) 2 in.	1½ in. with 3 ft. connecting piece of 2 in. diameter.	1½ in.	" " = $\frac{10}{25}$ " "	As above.
		2⅓ in.	" " = $\frac{13}{25}$ " "	
		3¼ in.	" " = $\frac{19}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$* " "	
(e) 2 in.	2 in. direct on the fall pipe	1½ in.	" " = $\frac{13}{35}$ " "	Only to be used by 4¾ in. depth of seal.
		2⅓ in.	" " = $\frac{18}{35}$ " "	
		3¼ in.	" " = $\frac{18}{35}$ " "	
		4 in.	" " = $\frac{35}{35}$ " "	
(f) 2 in.	2 in. with 3 ft. connecting piece of 2 in. diameter.	1½ in.	" " = $\frac{10}{35}$ " "	Must not be used at all.
		2⅓ in.	" " = $\frac{12}{35}$ " "	
		3¼ in.	" " = $\frac{15}{35}$ " "	
		4 in.	" " = $\frac{18}{35}$ " "	

EXPERIMENT II.—VERTICAL 2½ IN. FALL PIPE WITH PAN CONNECTIONS SPACED 9 FT. 10 IN. APART.

Branch.	Diameter of siphon.	Depth of water seal.	Emptied by suction.	Results.
(a) 1½ in.	1½ in. direct on the fall pipe.	1½ in.	At sieve diameter = $\frac{8}{25}$ of siphon diameter.	Can only be used with 4 in. depth of water seal and ½ diameter of sieve.
		2⅓ in.	" " = $\frac{13}{25}$ " "	
		3¼ in.	" " = $\frac{15}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$* " "	
(b) 1½ in.	1½ in. and 3 ft. 3 in. connecting piece of 1½ in. diameter.	1½ in.	" " = $\frac{7}{25}$ " "	Must not be used except with a special ventilating pipe.
		2⅓ in.	" " = $\frac{10}{25}$ " "	
		3¼ in.	" " = $\frac{12}{25}$ " "	
		4 in.	" " = $\frac{20}{25}$ " "	
(c) 2 in.	2 in. direct on fall pipe.	2⅓ in.	" " = $\frac{15}{35}$ " "	Can only be used with a depth of water seal of 4 in. and ½ diameter of sieve.
		3¼ in.	" " = $\frac{20}{35}$ " "	
		4 in.	" " = $\frac{25}{35}$ " "	
		4¾ in.	" " = $\frac{30}{35}$ " "	
(d) 2 in.	2 in. with 3 ft. 3 in. connecting piece of 2 in. diameter.	2⅓ in.	" " = $\frac{12}{35}$ " "	Can only be used with a depth of water seal of 4¾ in. and ½ diameter of sieve.
		3¼ in.	" " = $\frac{15}{35}$ " "	
		4 in.	" " = $\frac{20}{35}$ " "	
		4¾ in.	" " = $\frac{25}{35}$ " "	
(e) 2½ in.	2½ in. direct on fall pipe.	2⅓ in.	" " = $\frac{20}{36}$ " "	Must not be used at all.
		3¼ in.	" " = $\frac{24}{36}$ " "	
		4 in.	" " = $\frac{28}{36}$ " "	
		4¾ in.	" " = $\frac{32}{36}$ " "	
(f) 2½ in.	2½ in. with 3 ft. 3 in. connecting piece.	2⅓ in.	" " = $\frac{15}{36}$ " "	As above.
		3¼ in.	" " = $\frac{20}{36}$ " "	
		4 in.	" " = $\frac{25}{36}$ " "	
		4¾ in.	" " = $\frac{30}{36}$ " "	

* Emptying did not take place.

not end in a box, as hitherto used, but in a wire basket (Fig. 7) of a size at least equal to the free diameter of the fall pipe.

Now, follow the experiments made with a flat-laying drain of 2 in. diameter, which ran into the first fall pipe. Three pans also were connected with this drain. These were interchangeable, and we used 1½ in. siphons, with 1½, 2⅜, 3⅛, and 4 inches depth of water seal, and 2 in. siphons with 2⅜, 3, 4, and 4¾ inches depth of water seal. The distance of these pans from the fall pipe was 6 ft. 6 in., 9 ft. 9 in., and 13 ft. These were used either one at a time or simultaneously. In the former case the other two were closed up, so as to enable us to determine how the different distances between pan and fall pipe influenced the working of the arrangement.

As it was anticipated that the working of the siphons would somewhat depend upon the gradient of this drain, we placed it successively at 1:40, 1:20, 1:10, 1:5, 1:1. Since these trials only gave a negative result as far as the omission of secondary ventilation is concerned, it is unnecessary to give the details of the various trials, and we briefly summarize the result as follows:

The siphon of each single pan connected by such a drain to a fall pipe must always be ventilated if the pan is placed at a distance of more than 3 ft. 3 in. from the latter, unless the connecting piece is made at least ¼ in. wider, and the siphon constructed according to the rules, No. 3 and 4, laid down for vertical fall pipes. A single pan connected by a separate fall pipe with the main drain, if similarly constructed, requires no special ventilation, but in this case, as the one described above, a tap has to be provided in order to avoid the escape of sewer gas caused by evaporation of the water seal in case the pan is out of use for some months. Even in this case it is preferable to provide ventilation, and to omit it only when the structure of the building renders it too difficult of execution.

It is only necessary to place one ventilating shaft (of the same size as the side drain) at the farthest point from the fall pipe, provided that the former has a larger diameter than the siphons, and provided the siphons fulfil the conditions No. 3 and 4 above mentioned. In this case we must look upon these side drains as main drains, and these always require ventilating shafts. A secondary ventilation of each separate siphon is required if the above conditions are not fulfilled.

A second fall pipe, which was placed at the end of the main

FIG. 7.

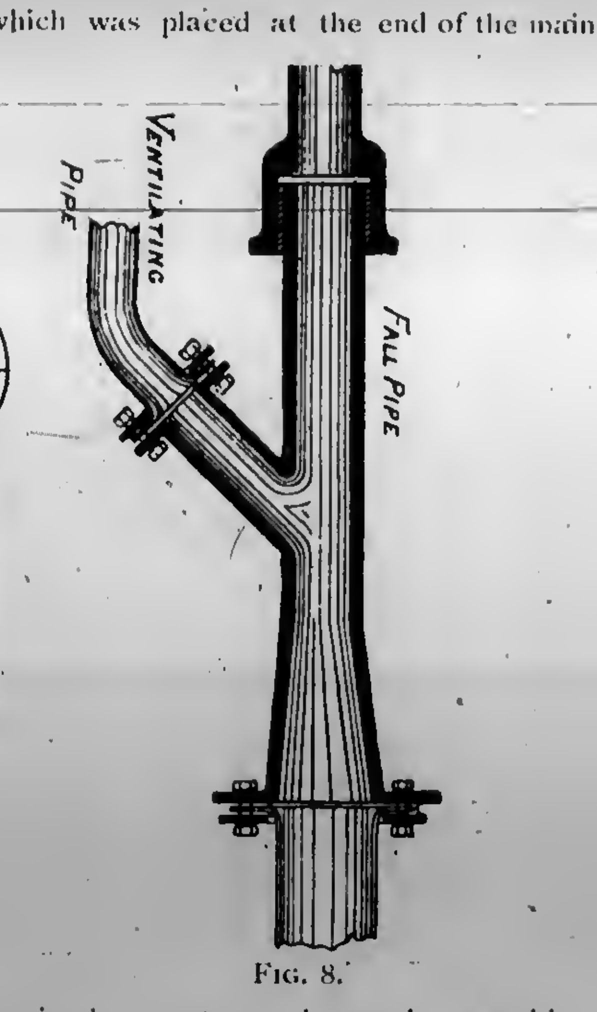


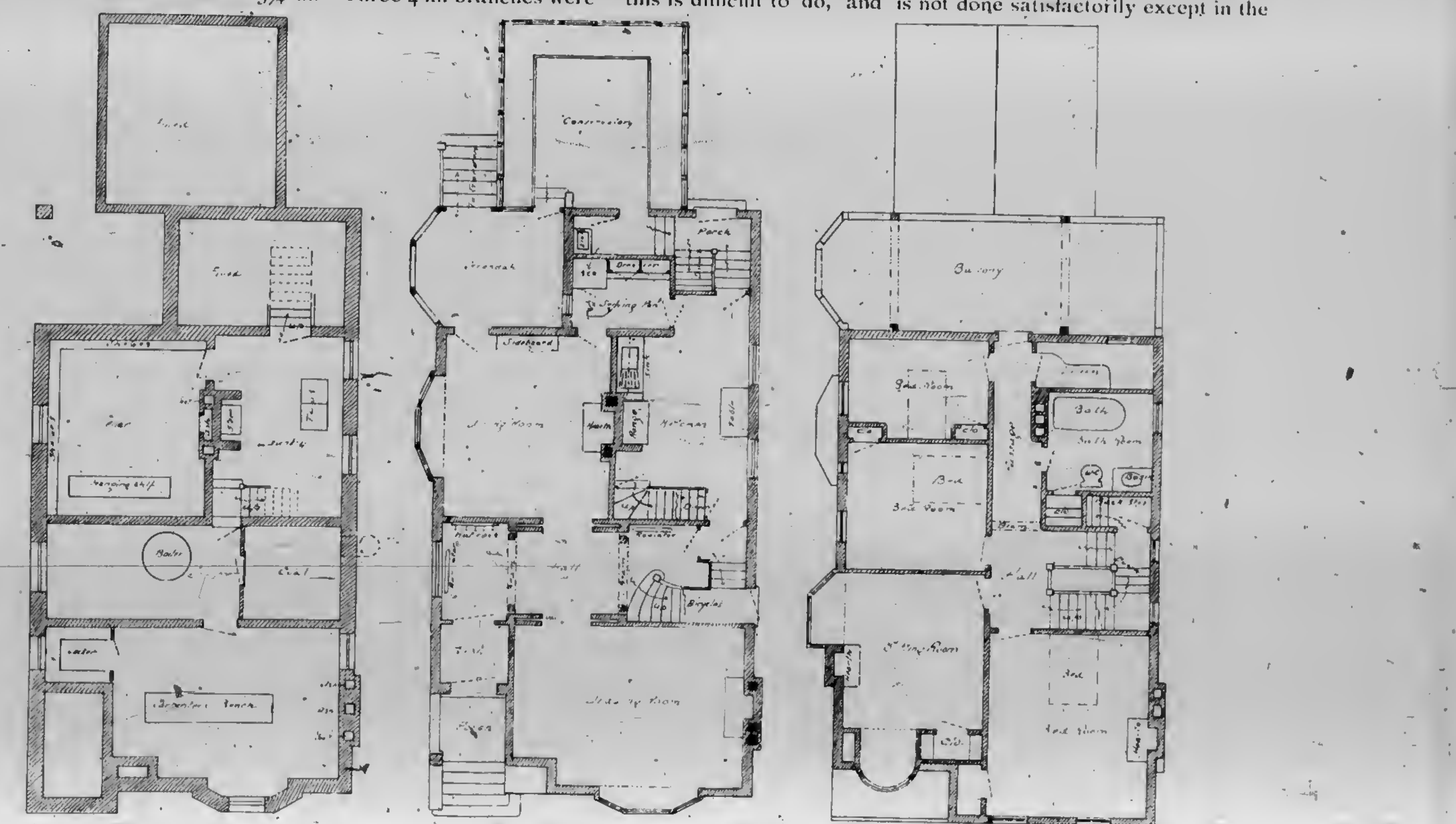
FIG. 8.

drain, was used to determine how water seals acted at a sudden influx of large quantities of water, such as occasioned by rain, baths, etc. Two of these pipes were erected consecutively. They

were of 2½ in. and 4 in. diameter respectively, and a pan having a 2 in. wide water-seal was connected with them. The water was poured in through a hose fitted with a gauge cock, so that the quantity of water could be accurately regulated.

We allowed that, as a rule, 118.4 square yards of roof required a 2½ in. pipe, while for 236.8 square yards superficial a 4 in. pipe would be sufficient. The equivalent of a rainfall of ¼ in. on 118.4 square yards is equal to 0.0616 gallons per second, and that of double the size of roof is equal to exactly double that quantity of water passing through the pipe. We made the following experiments on the 2½ in. fall pipe: (a) 0.11, 0.22, 0.44 gallons per second, as corresponding to a rainfall of 2.79 in., 5.58 in. and 11.16 in. on 118.4 square yards of roof; (b) 0.22, 0.44 and 0.88 gallons per second, corresponding to the same amount of rain on double the size of roof. The result was as follows: The water seal of the siphon connected with the 2½ in. pipe was not weakened by an inflow of 0.11 gallon per second. It was emptied by the 0.22 gallon per second, and consequently (1) by an 8.8 gallon per second flow: (2) on the 4 in. fall pipe 0.22 gallon per second weakened and 0.44 gallon per second broke the seal.—Therefore pans must not be connected with roof or bath-room drains. In any case a 4 in. deep water seal and special ventilation is required. In these experiments also we tested, by means of an anemometer, the volume of the air drawn down by the water. It appears superfluous to repeat here the various results, as they fully coincide with those made by the municipal architect of Posen, Mr. Grueder, and described in the Gesundheitsingenieur, 1896, No. 23.

In order to test the working of several w.c. siphons connected with one fall pipe, again the second pipe was used, first with a width of 4 in., then with one of 5¼ in. Three 4 in. branches were



PLANS OF HOUSE IN ROSEDALE, TORONTO.—(See illustration pages.)—R. J. Edwards, Architect.

connected with the w.c. siphon by means of a connecting piece 3 ft. 3 in. long and 4 in. wide. Siphons with a depth of water seal of 1 in. and 2 in. and 3.3 gallon cistern were used. The result was as follows: (1) w.c. siphons with 1 in. water seal always required ventilation, even if the fall pipe was 5¼ in. wide; (2) w.c. siphons with 2 in. water seal always required ventilation if their diameter was equal to that of the fall pipe; ventilation was still necessary if they were more than 3 ft. 3 in. distant from the latter, even when their diameter was smaller than that of the fall pipe. Regulations therefore should always expressly demand siphons of at least 2 in. water seal, placed not further than 3 ft. 3 in. from a fall pipe of at least 5¼ in. diameter. Should the latter be narrower, then secondary ventilation must be provided. No experiments were made with w.c. siphons having deeper water seals, because they have not proved self-cleansing with the methods usually employed in Cologne—i.e., ordinary ring or centre rinsing. It is desirable that such trials should be made with closets worked by vacuum pressure or by lever. All the above described experiments refer to fall pipes continued upwards in the same diameter. The narrowing of a 5¼ in. fall pipe to 4 in. gave unfavorable results.

It does not appear to be absolutely necessary, where structural difficulties exist, to insist upon the continuation of the fall pipe in the case where only one single w.c. siphon is connected on to a 5¾ in. fall pipe, provided that the siphon is connected direct with the same, and has a 2 in. water seal, and that there is behind the first fall pipe another one which is ending in such a continuation. It is, however, desirable to do so under any circumstances.

This concludes the experiments concerning the desirability of secondary ventilation.

It now remains to determine the conditions under which it is necessary to demand the erection of secondary ventilating shafts. This has to be done in the following cases: (1) when the siphons of the pans have less than 4 in. and those of the w.c.'s less than 2 in. depth of water seal; (2) when the diameter of the fall pipe is not larger than that of the siphon; (3) when fall pipes through which large quantities of water have to pass, and to which pans are connected, are constructed with 4 in. diameter or less; (4) when the distance of the pans from the fall pipe exceeds 3 ft. 3 in.: (5) when more than one pan is connected with a horizontal line (for gradients see previously)—in this case, however, it is sufficient to carry up one ventilator at the end of this line furthest away from the fall pipe.

Although we may take it for granted that the method in which secondary ventilating lines are to be constructed is generally known, yet it may not be superfluous to indicate how this should be done when required, because we have come across many installations which were badly planned with regard to that point.

As we have already mentioned, narrow ventilating pipes, and principally branch pipes from the siphon to the vertical ventilating pipe or fall pipe, have the tendency to accumulate fat, coffee grounds and cobwebs. The minimum diameter for the upward part should be 2 in., and that for a branch connection only ¼ in. less than that of the siphon. Lead, iron or zinced gas-pipes only must be used, and they must be either soldered, screwed or packed with hemp (Mening's patent) and leaded. In the case of the siphon being ventilated direct into the fall pipe, which appears admissible where there are only one or two of the former, the connection must be made at a point higher than the upper rim of the pan. This must be done with a screw thread made of brass set in horizontally. It should never be soldered direct, because this is difficult to do, and is not done satisfactorily except in the rarest instances. Branch connections with a vertical ventilating pipe must be executed in an angle of 45 deg. The upper end of the ventilating pipe may then be continued above the roof, either direct by itself or from above the last connection on the fall pipe. In the latter case the connection is best made by a separate piece (Fig. 8) with a flanged joint, and the widened fall pipe set over the upper flange. In the other case, both the ventilating and the fall pipe must be widened, beginning with 2 in. below the level of the roof.

In conclusion, I beg leave to communicate the results of a few experiments on the diameter of the water supply required with various sized siphons, on account of the flooding which often occurs when the former is unproportionally large. These results are, of course, dependent upon the pressure on the mains, and refer especially to Cologne, where a pressure of 3.5 atmospheres is applied. They demonstrated: (1) the quantity of water supplied by a 1 in. low screw tap is too large for a 2 in. pipe; (2) a ¾-inch tap brings 21.78 gallons in 70 seconds—for this quantity a 2 in. pipe without sieve is sufficient; (3) a ½ in. tap brings the same quantity in 100 seconds—a 2 in. pipe with a sieve of 50 per cent. of the diameter is sufficient for this; (4) a ⅜ in. tap brings the same quantity in 300 seconds, requiring a 1½ pipe with a 50 per cent. sieve. Consequently the size of taps is ½ in. for 2 in. siphons and ⅜ in. for 1½ in. siphons.

I think that, although the above results repeat much which was already known, some useful hints may be taken from them. Technical men who have to plan house drains may also be glad to receive actual proofs of points which they knew previously. Furthermore, many points were elucidated and proved which were not at all clear before, as is shown by the divergence of the various by-laws and regulations in this matter.

MANUFACTURES AND MATERIALS

CANADIAN NATURAL CEMENT.

FOR the purpose of demonstrating the quality of their material, Messrs. Battle, of Thorold, propose to build at their own expense a stone wall near the Soulanges Canal, using the identical cement which was rejected by the government engineer, Mr. Munro. The manufacturers point to the piers of the old Victoria bridge at Montreal, which were constructed with this cement, as evidence of its enduring quality under the most severe conditions.

CHARACTERISTICS OF BUILDING STONES.

MR. H. F. Bain, in the annual report of the Iowa Geological Survey for 1897, referring to the use of stone in building, draws attention to the fact that architects and engineers of the present day have before them a more difficult problem than that faced by the Egyptians and other early workers in the matter of climate. Not only is our climate in itself more trying than that of the semi-tropical southern countries in which the early builders worked, but the great size of our country and the modern development of transportation facilities results in a given stone being far more widely used than was any from the ancient quarries. We no longer build from stone quarried within a few miles of our building site, and hence cannot argue that the rock having stood for untold centuries in the quarry may well be expected to stand in the building. Our stone may be shipped so far as to be used under totally different climatic conditions from those affecting it in its native exposures.

Again, modern conditions of life are producing a marked effect on our climate. Particularly is this true in our cities, where under present circumstances so much of the stone must be used. Our universal use of steam, the great amount and often poor quality of coal burned, the imperfect combustion obtained, the large number of industries which, in the production of their wares, use chemical processes of some nature, all exert a marked influence on the purity of the air. It is doubtful if any stone used by the older builders was ever called upon to stand the insidious influence of so tainted an atmosphere as that to which our stones are exposed as a result of purely artificial conditions alone. This, coupled with the many trying natural conditions of humidity, variation in temperature, wind action, and unequal settling, all make the wise selection of stone a matter requiring much thought and a wide range of information.

A granite quarry of excellent quality is reported to have been recently discovered near Nictaux, Annapolis County, N.S.

Messrs. Andrew S. Baldwin and O'Brien & Gilmour have recently purchased the granite quarries at St. George, N.B., formerly owned by Taylor Bros.

Mr. C. J. Lewis, formerly connected with the Burlington Pressed Brick Co., has recently leased the works of the Toronto Terra Cotta Company near Milton, Ont., and will put the same in operation again.

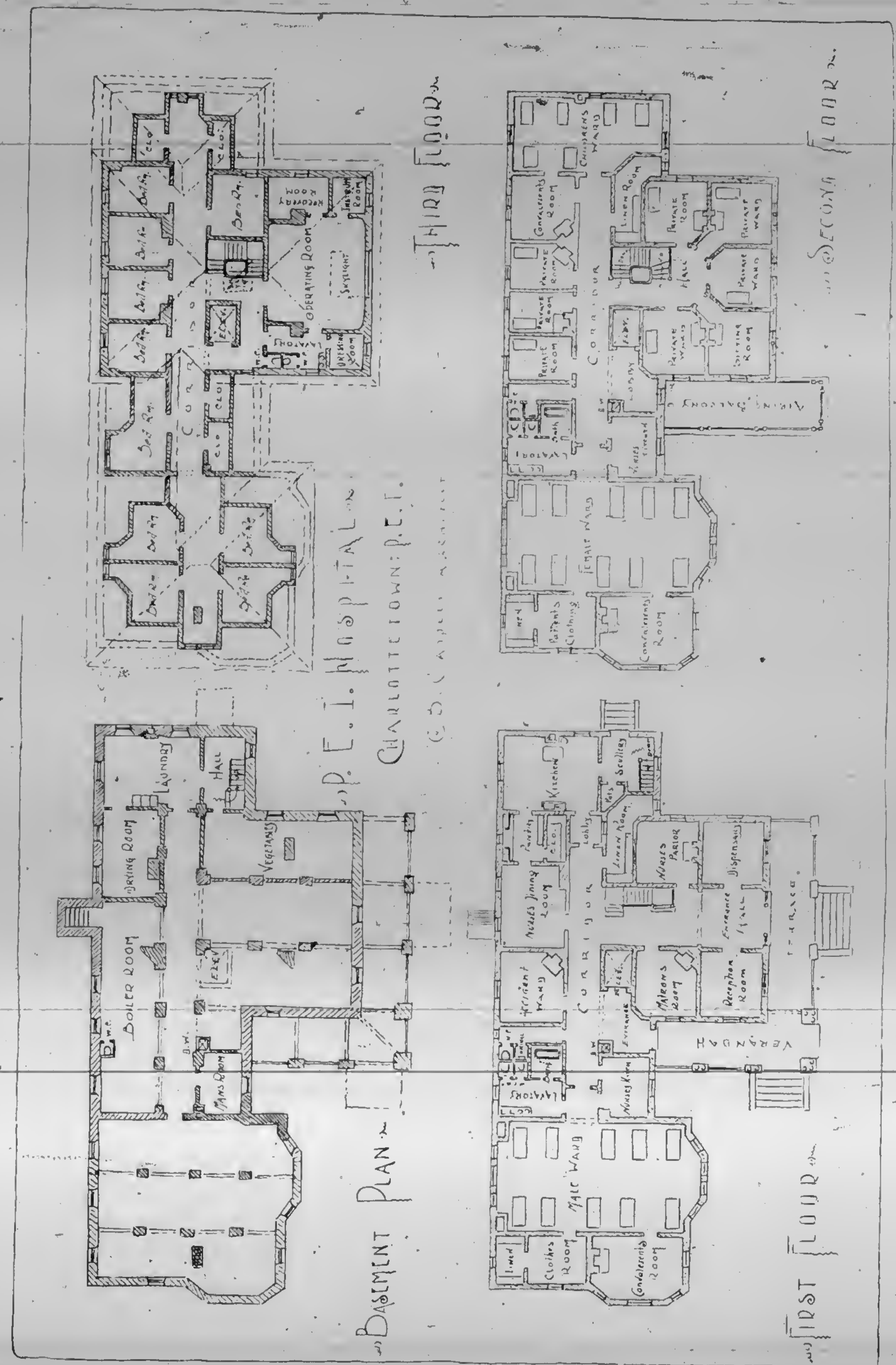
Messrs. R. M. Ramsay and C. M. Adams, of Chicago, and J. P. Wagner, of Buffalo, visited Toronto recently for the purpose of looking into the possibilities for the establishment of a factory for the manufacture of cast iron girders and other structural iron work. They are reported to have been favorably impressed with the conditions and prospects.

Mr. Hugh Cameron, of Brantford, visited Vancouver recently with the object of forming a company to manufacture a special class of bricks for building purposes. Mr. Warsap, manager of the C.P.R. cement works, is reported to have said that there exists a deposit of clay in the locality from which bricks of a deep chocolate color and capable of taking a fine glaze could be manufactured. Mr. Warsap states that, owing to the improper mixing of the materials, the bricks heretofore manufactured in the vicinity of Vancouver have been largely affected by the weather.

Mr. W. J. McBride, of Toronto Junction, is one of the leading promoters of a company which is said to have purchased twenty-two acres of clay land in East Toronto, from samples of which bricks are said to have been made upon which no impression could be made with a hammer or chisel. It is declared to be the

Almshouses, Chislehurst, England.
A. T. Taylor, F[illegible], Architect.

Hospital, Charlottetown, P.E.I.
C. B. Chappell Architect



Plan of Hospital, Charlottetown, P.E.I.
C. B. Chappell, Architect

EXPERIMENT I.—VERTICAL 2 IN. FALL PIPE WITH PAN CONNECTIONS SPACED 9 FT. 10 IN. APART.

Branch.	Diameter of siphon.	Depth of water seal.	Emptied by suction.	Results.
(a) 1½ in.	1½ in. direct on the fall pipe.	1½ in.	At sieve diameter = $\frac{7}{25}$ of siphon diameter.	Can only be used by 4 in. depth of seal and ½ sieve diameter.
		2⅓ in.	" " = $\frac{10}{25}$ " "	
		3¼ in.	" " = $\frac{12}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$ " "	
(b) 1½ in.	1½ in. and 3 ft. 3 in. connecting piece of 1½ in. diameter.	1½ in.	" " = $\frac{7}{25}$ " "	Must not be used without a separate ventilating pipe.
		2⅓ in.	" " = $\frac{9}{25}$ " "	
		3¼ in.	" " = $\frac{10}{25}$ " "	
		4 in.	" " = $\frac{13}{25}$ " "	
(c) 2 in.	1½ in. with small pipe of 2 in. to 1½ in. direct on fall pipe.	1½ in.	" " = $\frac{10}{25}$ " "	Can only be used with 3¼ in. depth of seal and ½ diameter of sieve, but preferably with 4 ft. depth of seal.
		2⅓ in.	" " = $\frac{13}{25}$ " "	
		3¼ in.	" " = $\frac{15}{35}$ " "	
		4 in.	" " = $\frac{25}{35}$* " "	
(d) 2 in.	1½ in. with 3 ft. connecting piece of 2 in. diameter.	1½ in.	" " = $\frac{10}{25}$ " "	As above.
		2⅓ in.	" " = $\frac{13}{25}$ " "	
		3¼ in.	" " = $\frac{10}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$* " "	
(e) 2 in.	2 in. direct on the fall pipe	1½ in.	" " = $\frac{13}{35}$ " "	Only to be used by 4¾ in. depth of seal.
		2⅓ in.	" " = $\frac{16}{35}$ " "	
		3¼ in.	" " = $\frac{18}{35}$ " "	
		4 in.	" " = $\frac{25}{35}$ " "	
(f) 2 in.	2 in. with 3 ft. connecting piece of 2 in. diameter.	1½ in.	" " = $\frac{12}{35}$ " "	Must not be used at all.
		2⅓ in.	" " = $\frac{12}{35}$ " "	
		3¼ in.	" " = $\frac{15}{35}$ " "	
		4 in.	" " = $\frac{18}{35}$ " "	

EXPERIMENT II.—VERTICAL 2½ IN. FALL PIPE WITH PAN CONNECTIONS SPACED 9 FT. 10 IN. APART.

Branch.	Diameter of siphon.	Depth of water seal.	Emptied by suction.	Results.
(a) 1½ in.	1½ in. direct on the fall pipe.	1½ in.	At sieve diameter = $\frac{8}{25}$ of siphon diameter.	Can only be used with 4 in. depth of water seal and ½ diameter of sieve.
		2⅓ in.	" " = $\frac{12}{25}$ " "	
		3¼ in.	" " = $\frac{16}{25}$ " "	
		4 in.	" " = $\frac{25}{25}$* " "	
(b) 1½ in.	1½ in. and 3 ft. 3 in. connecting piece of 1½ in. diameter.	1½ in.	" " = $\frac{7}{25}$ " "	Must not be used except with a special ventilating pipe.
		2⅓ in.	" " = $\frac{10}{25}$ " "	
		3¼ in.	" " = $\frac{12}{25}$ " "	
		4 in.	" " = $\frac{20}{25}$ " "	
(c) 2 in.	2 in. direct on fall pipe.	2⅓ in.	" " = $\frac{18}{35}$ " "	Can only be used with a depth of water seal of 4 in. and ½ diameter of sieve.
		3¼ in.	" " = $\frac{20}{35}$ " "	
		4 in.	" " = $\frac{26}{35}$ " "	
		4¾ in.	" " = $\frac{30}{35}$ " "	
(d) 2 in.	2 in. with 3 ft. 3 in. connecting piece of 2 in. diameter.	2⅓ in.	" " = $\frac{12}{35}$ " "	Can only be used with a depth of water seal of 4¾ in. and ½ diameter of sieve.
		3¼ in.	" " = $\frac{15}{35}$ " "	
		4 in.	" " = $\frac{20}{35}$ " "	
		4¾ in.	" " = $\frac{30}{35}$ " "	
(e) 2½ in.	2½ in. direct on fall pipe.	2⅓ in.	" " = $\frac{20}{55}$ " "	Must not be used at all.
		3¼ in.	" " = $\frac{24}{55}$ " "	
		4 in.	" " = $\frac{28}{55}$ " "	
		4¾ in.	" " = $\frac{32}{55}$ " "	
(f) 2½ in.	2½ in. with 3 ft. 3 in. connecting piece.	2⅓ in.	" " = $\frac{15}{55}$ " "	As above.
		3¼ in.	" " = $\frac{20}{55}$ " "	
		4 in.	" " = $\frac{22}{55}$ " "	
		4¾ in.	" " = $\frac{30}{55}$ " "	

* Emptying did not take place.

not end in a box, as hitherto used, but in a wire basket (Fig. 7) of a size at least equal to the free diameter of the fall pipe.

Now, follow the experiments made with a flat-laying drain of 2 in. diameter, which ran into the first fall pipe. Three pans also were connected with this drain. These were interchangeable, and we used 1½ in. siphons, with 1½, 2⅜, 3⅛, and 4 inches depth of water seal, and 2 in. siphons with 2⅜, 3, 4, and 4¾ inches depth of water seal. The distance of these pans from the fall pipe was 6 ft. 6 in., 9 ft. 9 in., and 13 ft. These were used either one at a time or simultaneously. In the former case the other two were closed up, so as to enable us to determine how the different distances between pan and fall pipe influenced the working of the arrangement.

As it was anticipated that the working of the siphons would somewhat depend upon the gradient of this drain, we placed it successively at 1:40, 1:20, 1:10, 1:5, 1:1. Since these trials only gave a negative result as far as the omission of secondary ventilation is concerned, it is unnecessary to give the details of the various trials, and we briefly summarize the result as follows:

The siphon of each single pan connected by such a drain to a fall pipe must always be ventilated if the pan is placed at a distance of more than 3 ft. 3 in. from the latter, unless the connecting piece is made at least ¼ in. wider, and the siphon constructed according to the rules, No. 3 and 4, laid down for vertical fall pipes. A single pan connected by a separate fall pipe with the main drain, if similarly constructed, requires no special ventilation, but in this case, as the one described above, a tap has to be provided in order to avoid the escape of sewer gas caused by evaporation of the water seal in case the pan is out of use for some months. Even in this case it is preferable to provide ventilation, and to omit it only when the structure of the building renders it too difficult of execution.

It is only necessary to place one ventilating shaft (of the same size as the side drain) at the farthest point from the fall pipe, provided that the former has a larger diameter than the siphons, and provided the siphons fulfil the conditions No. 3 and 4 above mentioned. In this case we must look upon these side drains as main drains, and these always require ventilating shafts. A secondary ventilation of each separate siphon is required if the above conditions are not fulfilled.

A second fall pipe, which was placed at the end of the main

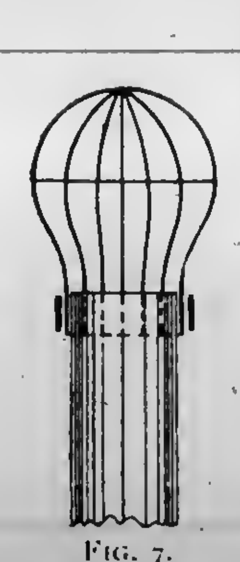


FIG. 7.

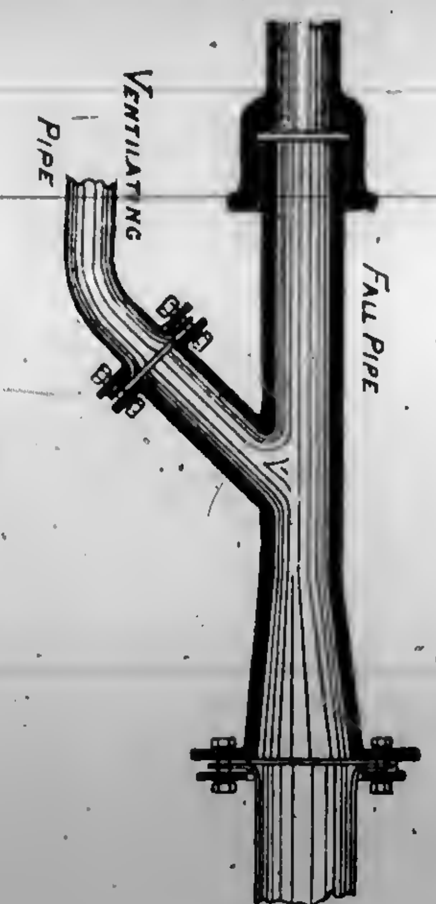


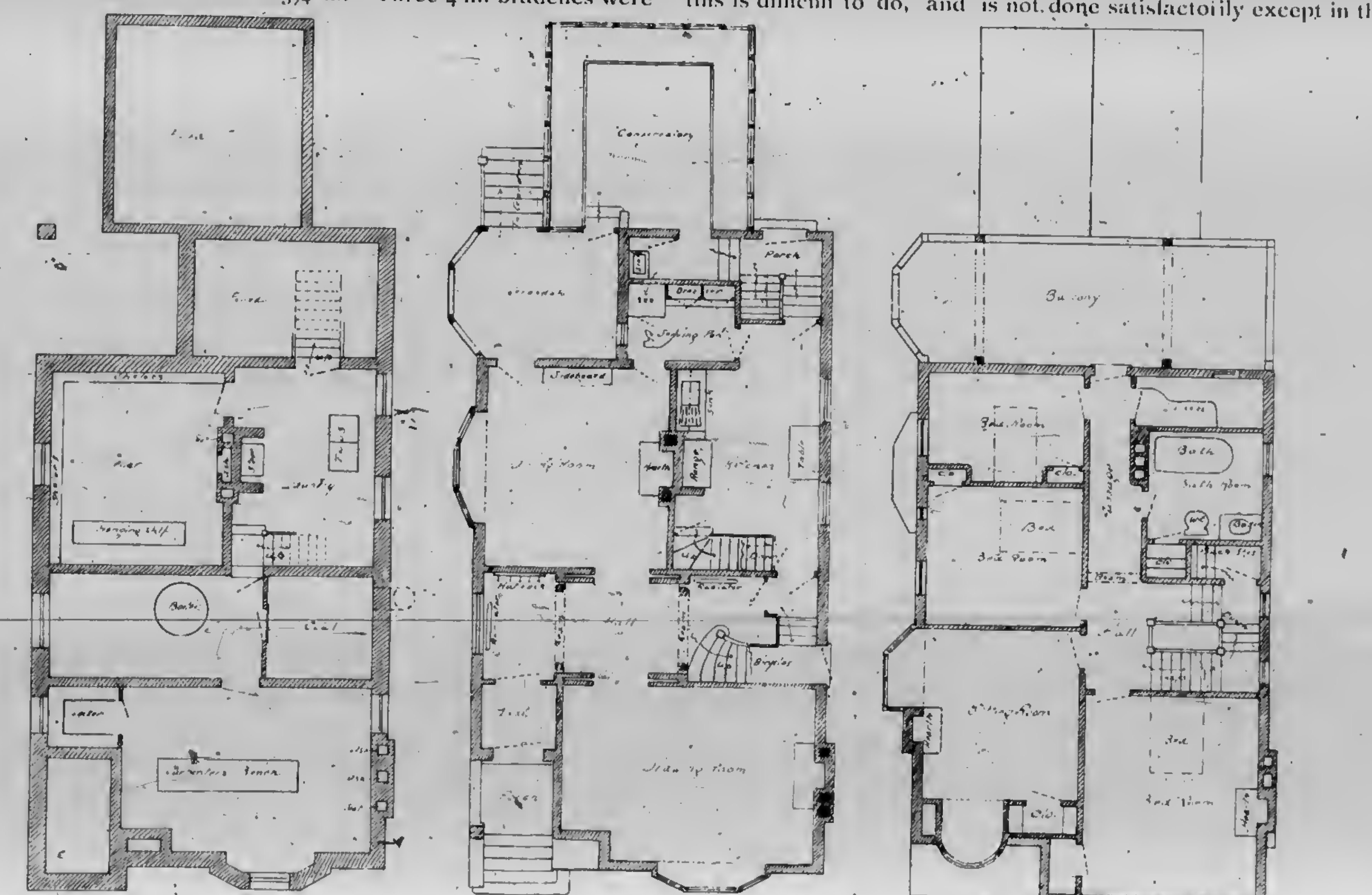
FIG. 8.

drain, was used to determine how water seals acted at a sudden influx of large quantities of water, such as occasioned by rain, baths, etc. Two of these pipes were erected consecutively. They

were of 2½ in. and 4 in. diameter respectively, and a pan having a 2 in. wide water-seal was connected with them. The water was poured in through a hose fitted with a gauge cock, so that the quantity of water could be accurately regulated.

We allowed that, as a rule, 118.4 square yards of roof required a 2½ in. pipe, while for 236.8 square yards superficial a 4 in. pipe would be sufficient. The equivalent of a rainfall of ¼ in. on 118.4 square yards is equal to 0.0616 gallons per second, and that of double the size of roof is equal to exactly double that quantity of water passing through the pipe. We made the following experiments on the 2½ in. fall pipe: (a) 0.11, 0.22, 0.44 gallons per second, as corresponding to a rainfall of 2.79 in., 5.58 in. and 11.16 in. on 118.4 square yards of roof; (b) 0.22, 0.44 and 0.88 gallons per second, corresponding to the same amount of rain on double the size of roof. The result was as follows: The water seal of the siphon connected with the 2½ in. pipe was not weakened by an inflow of 0.11 gallon per second. It was emptied by the 0.22 gallon per second, and consequently (1) by an 8.8 gallon per second flow; (2) on the 4 in. fall pipe 0.22 gallon per second weakened and 0.44 gallon per second broke the seal. Therefore pans must not be connected with roof or bath-room drains. In any case a 4 in. deep water seal and special ventilation is required. In these experiments also we tested, by means of an anemometer, the volume of the air drawn down by the water. It appears superfluous to repeat here the various results, as they fully coincide with those made by the municipal architect of Posen, Mr. Grueder, and described in the Gesundheitsingenieur, 1896, No. 23.

In order to test the working of several w.c. siphons connected with one fall pipe, again the second pipe was used, first with a width of 4 in., then with one of 5¼ in. Three 4 in. branches were



PLANS OF HOUSE IN ROSEDALE, TORONTO.—(See illustration pages.)—R. J. Edwards, Architect.

connected with the w.c. siphon by means of a connecting piece 3 ft. 3 in. long and 4 in. wide. Siphons with a depth of water seal of 1 in. and 2 in. and 3.3 gallon cistern were used. The result was as follows: (1) w.c. siphons with 1 in. water seal always required ventilation, even if the fall pipe was 5¼ in. wide; (2) w.c. siphons with 2 in. water seal always required ventilation if their diameter was equal to that of the fall pipe; ventilation was still necessary if they were more than 3 ft. 3 in. distant from the latter, even when their diameter was smaller than that of the fall pipe. Regulations therefore should always expressly demand siphons of at least 2 in. water seal, placed not further than 3 ft. 3 in. from a fall pipe of at least 5¼ in. diameter. Should the latter be narrower, then secondary ventilation must be provided. No experiments were made with w.c. siphons having deeper water seals, because they have not proved self-cleansing with the methods usually employed in Cologne—i.e., ordinary ring or centre rinsing. It is desirable that such trials should be made with closets worked by vacuum pressure or by lever. All the above described experiments refer to fall pipes continued upwards in the same diameter. The narrowing of a 5¼ in. fall pipe to 4 in. gave unfavorable results.

It does not appear to be absolutely necessary, where structural difficulties exist, to insist upon the continuation of the fall pipe in the case where only one single w.c. siphon is connected on to a 5¾ in. fall pipe, provided that the siphon is connected direct with the same, and has a 2 in. water seal, and that there is behind the first fall pipe another one which is ending in such a continuation. It is, however, desirable to do so under any circumstances.

This concludes the experiments concerning the desirability of secondary ventilation.

It now remains to determine the conditions under which it is necessary to demand the erection of secondary ventilating shafts. This has to be done in the following cases: (1) when the siphons of the pans have less than 4 in. and those of the w.c.'s less than 2 in. depth of water seal; (2) when the diameter of the fall pipe is not larger than that of the siphon; (3) when fall pipes through which large quantities of water have to pass, and to which pans are connected, are constructed with 4 in. diameter or less; (4) when the distance of the pans from the fall pipe exceeds 3 ft. 3 in.; (5) when more than one pan is connected with a horizontal line (for gradients see previously)—in this case, however, it is sufficient to carry up one ventilator at the end of this line furthest away from the fall pipe.

Although we may take it for granted that the method in which secondary ventilating lines are to be constructed is generally known, yet it may not be superfluous to indicate how this should be done when required, because we have come across many installations which were badly planned with regard to that point.

As we have already mentioned, narrow ventilating pipes, and principally branch pipes from the siphon to the vertical ventilating pipe or fall pipe, have the tendency to accumulate fat, coffee grounds and cobwebs. The minimum diameter for the upward part should be 2 in., and that for a branch connection only ¼ in. less than that of the siphon. Lead, iron or zinced gas-pipes only must be used, and they must be either soldered, screwed or packed with hemp (Mening's patent) and leaded. In the case of the siphon being ventilated direct into the fall pipe, which appears admissible where there are only one or two of the former, the connection must be made at a point higher than the upper rim of the pan. This must be done with a screw thread made of brass set in horizontally. It should never be soldered direct, because this is difficult to do, and is not done satisfactorily except in the rarest instances. Branch connections with a vertical ventilating pipe must be executed in an angle of 45 deg. The upper end of the ventilating pipe may then be continued above the roof, either direct by itself or from above the last connection on the fall pipe. In the latter case the connection is best made by a separate piece (Fig. 8) with a flanged joint, and the widened fall pipe set over the upper flange. In the other case, both the ventilating and the fall pipe must be widened, beginning with 2 in. below the level of the roof.

In conclusion, I beg leave to communicate the results of a few experiments on the diameter of the water supply required with various sized siphons, on account of the flooding which often occurs when the former is unproportionally large. These results are, of course, dependent upon the pressure on the mains, and refer especially to Cologne, where a pressure of 3.5 atmospheres is applied. They demonstrated: (1) the quantity of water supplied by a 1 in. low screw tap is too large for a 2 in. pipe; (2) a ¾-inch tap brings 21.78 gallons in 70 seconds—for this quantity a 2 in. pipe without sieve is sufficient; (3) a ½ in. tap brings the same quantity in 100 seconds—a 2 in. pipe with a sieve of 50 per cent. of the diameter is sufficient for this; (4) a ⅜ in. tap brings the same quantity in 300 seconds, requiring a 1½ pipe with a 50 per cent. sieve. Consequently the size of taps is ½ in. for 2 in. siphons and ⅜ in. for 1½ in. siphons.

I think that, although the above results repeat much which was already known, some useful hints may be taken from them. Technical men who have to plan house drains may also be glad to receive actual proofs of points which they knew previously. Furthermore, many points were elucidated and proved which were not at all clear before, as is shown by the divergence of the various by-laws and regulations in this matter.

MANUFACTURES AND MATERIALS

CANADIAN NATURAL CEMENT.

FOR the purpose of demonstrating the quality of their material, Messrs. Battle, of Thorold, propose to build at their own expense a stone wall near the Soulanges Canal, using the identical cement which was rejected by the government engineer, Mr. Munro. The manufacturers point to the piers of the old Victoria bridge at Montreal, which were constructed with this cement, as evidence of its enduring quality under the most severe conditions.

CHARACTERISTICS OF BUILDING STONES.

MR. H. F. Bain, in the annual report of the Iowa Geological Survey for 1897, referring to the use of stone in building, draws attention to the fact that architects and engineers of the present day have before them a more difficult problem than that faced by the Egyptians and other early workers in the matter of climate. Not only is our climate in itself more trying than that of the semi-tropical southern countries in which the early builders worked, but the great size of our country and the modern development of transportation facilities results in a given stone being far more widely used than was any from the ancient quarries. We no longer build from stone quarried within a few miles of our building site, and hence cannot argue that the rock having stood for untold centuries in the quarry may well be expected to stand in the building. Our stone may be shipped so far as to be used under totally different climatic conditions from those affecting it in its native exposures.

Again, modern conditions of life are producing a marked effect on our climate. Particularly is this true in our cities, where under present circumstances so much of the stone must be used. Our universal use of steam, the great amount and often poor quality of coal burned, the imperfect combustion obtained, the large number of industries which, in the production of their wares, use chemical processes of some nature, all exert a marked influence on the purity of the air. It is doubtful if any stone used by the older builders was ever called upon to stand the insidious influence of so tainted an atmosphere as that to which our stones are exposed as a result of purely artificial conditions alone. This, coupled with the many trying natural conditions of humidity, variation in temperature, wind action, and unequal settling, all make the wise selection of stone a matter requiring much thought and a wide range of information.

A granite quarry of excellent quality is reported to have been recently discovered near Nictaux, Annapolis County, N.S.

Messrs. Andrew S. Baldwin and O'Brien & Gilmour have recently purchased the granite quarries at St. George, N.B., formerly owned by Taylor Bros.

Mr. C. J. Lewis, formerly connected with the Burlington Pressed Brick Co., has recently leased the works of the Toronto Terra Cotta Company near Milton, Ont., and will put the same in operation again.

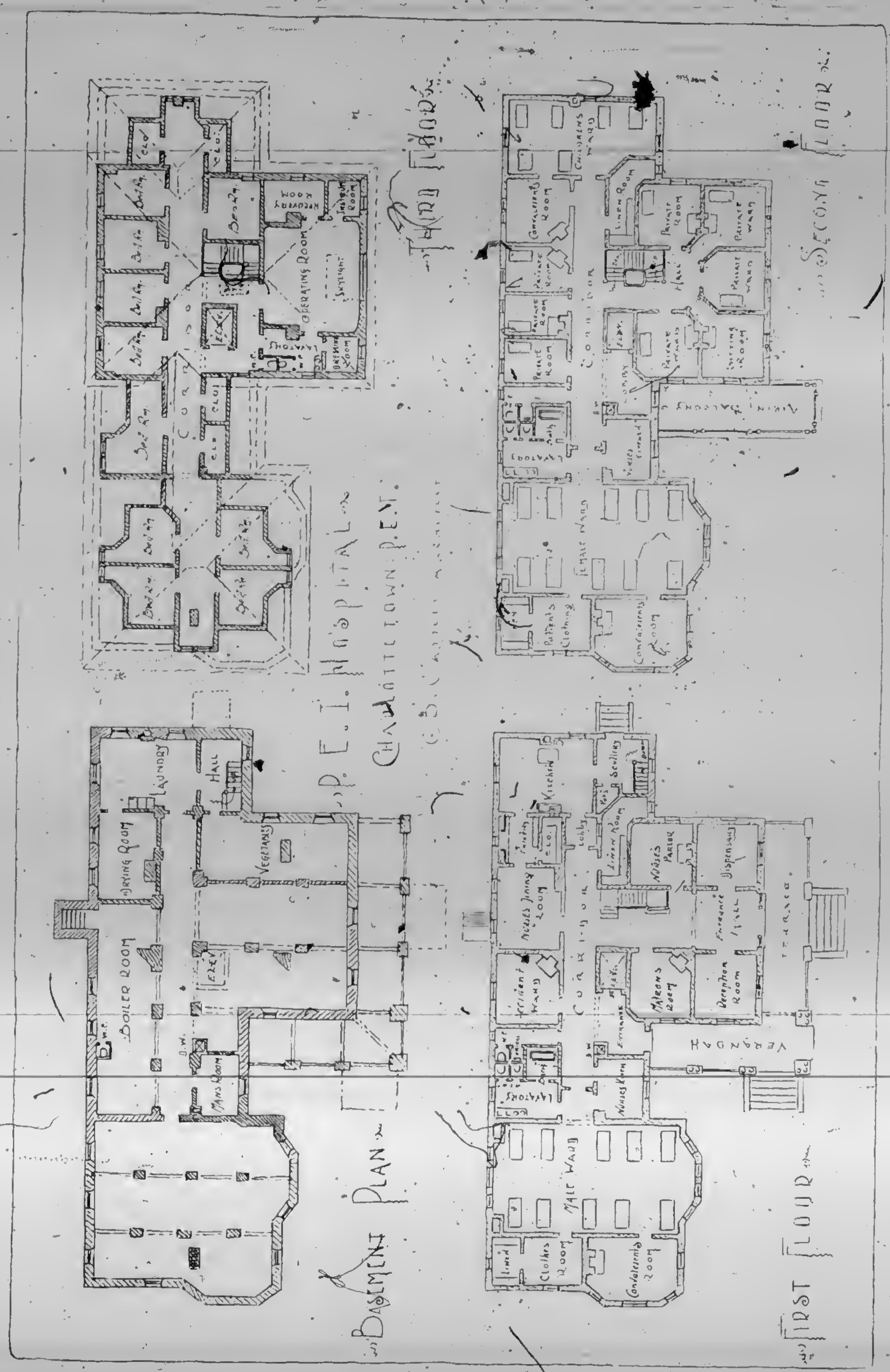
Messrs. R. M. Ramsay and C. M. Adams, of Chicago, and J. P. Wagner, of Buffalo, visited Toronto recently for the purpose of looking into the possibilities for the establishment of a factory for the manufacture of cast iron girders and other structural iron work. They are reported to have been favorably impressed with the conditions and prospects.

Mr. Hugh Cameron, of Brantford, visited Vancouver recently with the object of forming a company to manufacture a special class of bricks for building purposes. Mr. Warsap, manager of the C.P.R. cement works, is reported to have said that there exists a deposit of clay in the locality from which bricks of a deep chocolate color and capable of taking a fine glaze could be manufactured. Mr. Warsap states that, owing to the improper mixing of the materials, the bricks heretofore manufactured in the vicinity of Vancouver have been largely affected by the weather.

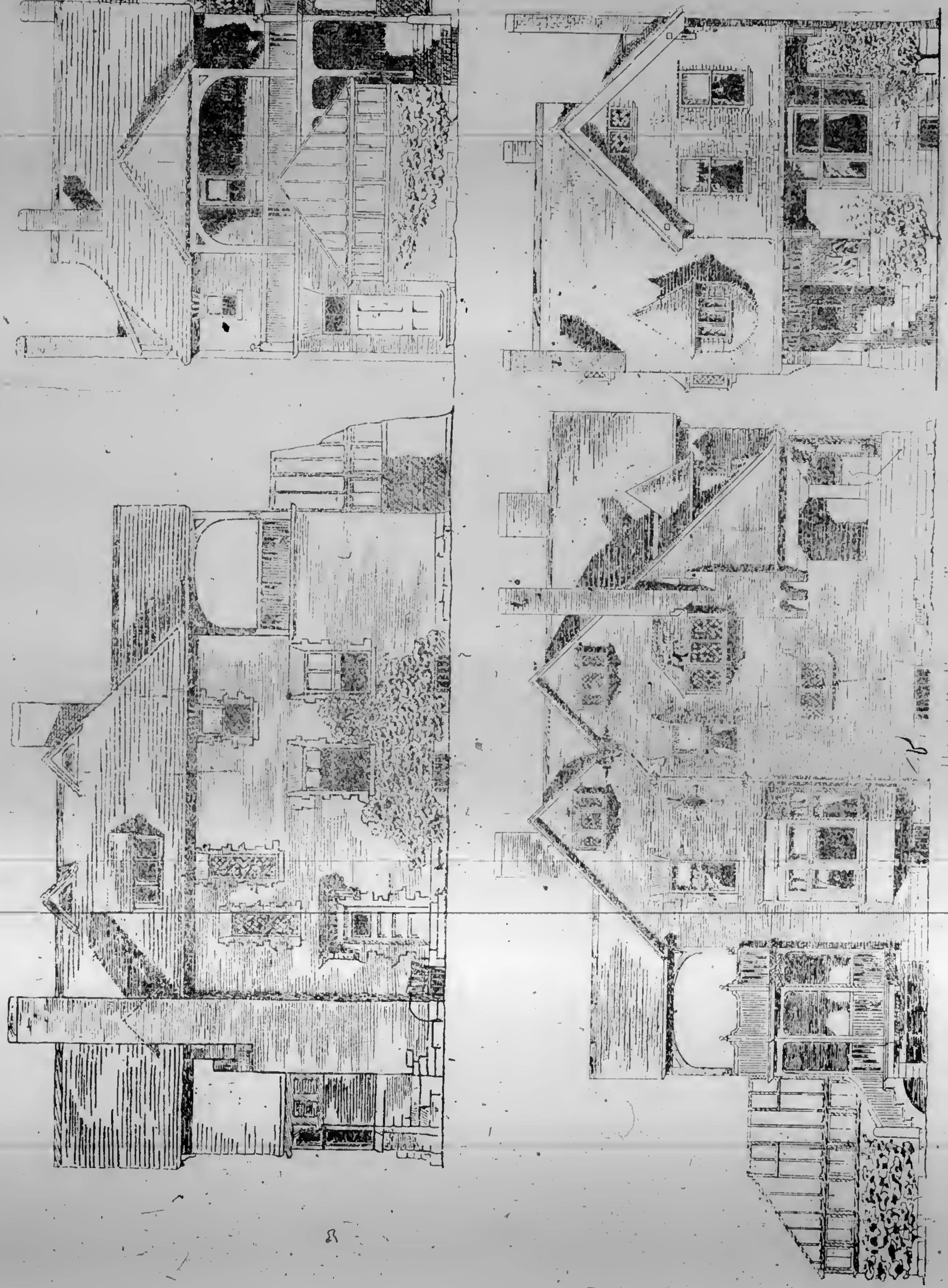
Mr. W. J. McBride, of Toronto Junction, is one of the leading promoters of a company which is said to have purchased twenty-two acres of clay land in East Toronto, from samples of which bricks are said to have been made upon which no impression could be made with a hammer or chisel. It is declared to be the

ALMSHOUSES, [illegible]HURST, ENGLAND.
A. T. TAYL[illegible] F[illegible] ARCHITECT.

HOSPITAL, CHARLOTTETOWN, P.E.I.
C. B. CHAPPELL, ARCHITECT.



PLAN OF HOSPITAL, CHARLOTTETOWN, P.E.I.
C. B. CHAPPELL, ARCHITECT.



HOUSE IN ROSEDALE, TORONTO.
R. J. EDWARDS, ARCHITECT.